ELECTRICAL REVIEW

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ELECTRICAL REVIEW

Vol. CXLVI No. 3767 3RD FEBRUARY, 1950

THE OLDEST ELECTRICAL PAPER • ESTABLISHED 1872

The N.P.L. Jubilee

HALF A CENTURY OF STURDY GROWTH

PREPARATIONS now actively proceeding for the Festival of Britain, 1951, are a reminder of the landmark which the "Great Exhibition" of 1851 became in the history of technical education in England.

There is no need to trace the spread of research from the academic centres outward into industry. It will suffice for our present purpose to recall that forty-nine years after the Hyde Park exhibition, following the establishment of the Physikalische Technische Reichsanstalt at Charlottenburg, there was founded the National Physical Laboratory at Teddington, where it has grown up round Bushy House, an old Royal residence in Bushy Park, which was granted by the Crown for the purpose.

Ten Divisions

There have been five directors of this laboratory's half-century of continuous expansion. During the administration of the late Sir Richard Glazebrook (1900-19) the essentials of the present organization were evolved. Dr. E. C. Bullard now directs activities in sixteen large and a number of small buildings on a 50-acre site. There are ten divisions, each under a superintendent, respectively concerned with aero-dynamics, electricity and magnetism, engineering, light, mathematics and statistics, metallurgy, metrology, physics, radio and ship design in relation to hull-form and propulsion.

All these were represented at a jubilee exhibition this week at the Royal Society, which continues to control the work of the laboratory (since 1918 by agreement with the then newly constituted Department of Scientific and Industrial Research) by the appointment of a General Board with an Executive Committee, representative of both pure and applied science, to manage its affairs. It was the expansion of the laboratory which led to the transfer of responsibility for its maintenance and development.

Precise Measurement

The purpose for which the N.P.L. was established fifty years ago, which it continues admirably to fulfil, was to conduct research, especially that necessary for increasing the accuracy with which physical constants of materials are determined and for maintaining standards of measurement. The legal responsibility for the various standards is vested in the appropriate Ministries, but they rely for expert knowledge and technical advice upon the N.P.L., which is thus in charge of the British legal electrical standards (ampere, volt, ohm), the maintenance of which has been an important function of the laboratory from the beginning. It has taken a continuously active part in the realization of both the international and c.g.s. units of electrical measurement; of the secondary standards needed to determine derived electrical quantities (capacity, inductance, etc.); and it also has charge of the radio standards of frequency and other quantities dealt with in wireless engineering.

Though originally intended to be an institution primarily concerned with precise measurement, without which few engineering activities could continue, in its subsequent expansion the laboratory has extended its services to almost any responsible body, or individual, in furtherance of the purposes defined by the Prince of Wales (afterwards King George V) when he opened the laboratory two years after its foundation on 1st January, 1900:—

> "... to bring scientific knowledge to bear practically on our everyday industrial and commercial life, to break down the barrier between theory and practice..."

This is the prime duty of the D.S.I.R., of which the N.P.L. is now the largest establishment; it will be, one hopes, the basis of all further development of State interest in industrial research.

COMMISSIONERS' FINAL REPORT

Two more documents can now be added to the historical records of the electricity supply industry. One is the first report of the British Electricity Authority, which has already been summarized and commented upon. The other is the twenty-third (final) report of the former Electricity Commissioners — eighteen months after they were "dissolved"— whose remaining functions were inherited by the Minister of Fuel and Power. Following prefatory observations, this report of 59 pages briefly reviews the Commissioners' administration (1920-48) and traces the growth of the industry, with the aid of tabulated statistical returns, over that period; then it records in detail their proceedings between 1st April, 1947, and 31st July, 1948. The report is published for the Ministry by H.M. Stationery Office at 3s net.

HARROGATE CONVENTION

It was considered by many delegates to the first British Electrical Power Convention, at Torquay last June, that it was too much of a B.E.A. affair. This was perhaps inevitable because it supplanted the I.M.E.A. annual convention and it was difficult to break away immediately from the electricity supply atmosphere. Account has been taken of this feeling and of experience gained at Torquay so that the programme of the second Convention is much more acceptable generally. No arrangements seem to have been made for the separate meetings of the B.E.A. and Area Board people which occupied the first two days at Torquay and the papers are very largely of manufacturing interest. Last year there was a paper by an electrical contractor but no provision appears to have been made for one this year. The paper which is to be contributed jointly by the B.E.A. and the manufacturers should be of considerable interest. It will be seen that the Watertube Boilermakers' Association is taking a hand in it and boiler equipment is the Authority's greatest present handicap.

TWO-WAY TRAFFIC

While power station progress in this country owes much to experience gained in the United States under conditions that permit of wider development, the debt owed by Great Britain is being continually repaid. Thus the already fine performance of Hutchings station (described on page 202) is expected to be considerably enhanced by the adoption for extensions of steam reheat, which—first used on our North-East Coast nearly thirty years ago—is now finding increasing favour in the States. Again, a 60 MW alternator to be installed at Hutchings will be associated with a three-phase transformer of 75,000 kVA—a capacity that was made here when the grid was erected—instead of a bank of three single-phase units as hitherto.

UNIT LAYOUT

Owing to the high calorific value of the coal often used for generating electricity in the U.S. (e.g., at Hutchings more than 20 per cent above the average for British power stations) the adoption of the inherently efficient "unit" (one boiler—one turbine) layout is more feasible. Boiler availability is thereby greatly improved, consequently reducing capital expenditure, operation and maintenance costs with overall results which the difference in the heat value only partly makes apparent. The essential need to use low-grade fuel for the purpose here is likely to lead to important divergencies in practice between the two countries.

ELECTRICAL CATERING

Labour-saving Aids for Hotels and Restaurants

THE increase in wages in the catering industry provides a further incentive to proprietors of hotels, boarding houses, restaurants, etc., to take further advantage of the labour-saving facilities which electricity can supply. They should have no difficulty in finding equipment to meet their various needs among the exceptionally comprehensive display which until this evening (Friday) can be seen at the Hotel, Restaurant and Catering Exhibition at Olympia, London.

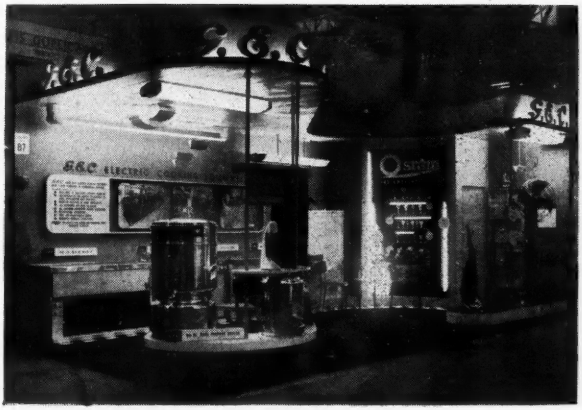
One of the most striking exhibits is that of the Simplex Electric Co., Ltd., comprising a full range of "Creda" heavy duty cooking equipment. This includes a griller, hot cupboard, single oven range, chef range, roaster and a new restaurant range with one large and one small oven suitable for cooking economically for any number of persons from six to sixty. Thanks to improved production facilities it has been possible to make considerable reductions in the prices of the roasters, ranges (except the chef range) steaming ovens and the restaurant range. Special attention is drawn to the company's kitchen planning service.

Many new features are embodied in the design of the General Electric Co.'s exhibits which include a single-oven range, boiling table, hot cupboard with à la carte top, griller, toaster, vegetable boiler and 3-gal water boiler. Of particular importance both in installation and maintenance is the accessibility of all electrical assemblies especially the switch boxes and wiring chambers.

Hotplates are of the anti-drip type eliminating difficulties arising from spillage or cleaning, while uniform heating of the ovens is assured by the exclusive use of "Inconel" sheathed wire type elements. Other G.E.C. items on view are slot-meter fires, storage water heaters (3 and 50 gal.), vacuum cleaners and floor polishers, the "Xpelair" with a new draught excluding shutter, and decorative lighting fittings employing fluorescent and cold cathode tubes.

The Jackson Electric Stove Co., Ltd., which recently supplied the cooking equipment for the principal kitchen at the B.E.A. headquarters, is showing a comprehensive range of equipment similar in design to that employed in that installation. Cookers for both large and small catering establishments are displayed, as well as steaming ovens, pastry ovens, grills, milk and water urns and vegetable boiling pans. Hot cupboards range from the small domestic model to large sizes fitted with soup pots and vegetable containers. A hospital type food trolley can also be seen.

Besides steaming ovens, James Stott & Co. (Engineers), Ltd., specialize in water boilers and café sets and soup

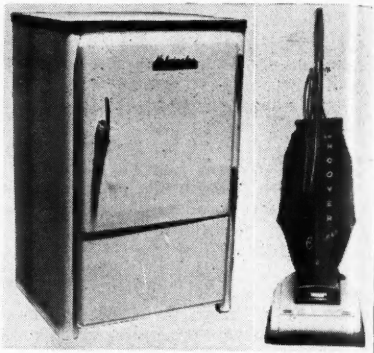


Industrial catering equipment of all kinds is represented on the General Electric stand

warmers. A confectioners' oven, a griddle plate and a dishwarmer which retains its heat for an hour after disconnection from the electricity supply are equipment of Dutch design found on the stand of White Cooking Equipment, Ltd. Multi-slice toasters can be seen on the stands of Frank V. Magrini, Ltd., and the Euk Manufacturing Co., Ltd., while A. Yeates & Sons, Ltd., make a feature of the S.L.R. waffle iron.

To demonstrate modern fish frying methods twelve members of the National Association of Restaurant Engineers are co-operating in a combined exhibit. Several types of potato peelers can be seen and among those supplying electric fryers are Faulkner & Co., Teuten & Co., G. Mallinson & Sons, Ltd., Frank Ford, Euk Catering Machinery, Ltd., and John Rouse (Oldham), Ltd.

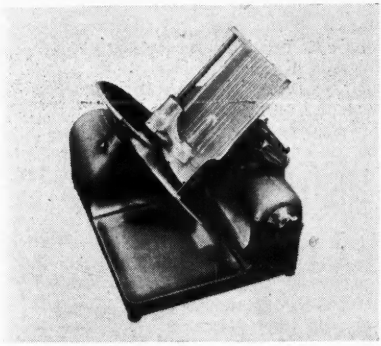
For the individual frying of fish, Crypto, Ltd., introduces the "Frylux" which incorporates a visible cold zone to remove any sediment that collects. A new "three-in-one" machine made by Rowe Bros. & Co., Ltd., comprises a steaming oven, fish fryer and hot cupboard, each unit being obtainable separately. Several new potato peelers make their appearance, among them a 7 lb model by the Avamore Engineering Co., Ltd., a unit of double this capacity by Swift and Swallow, Ltd., and a 28 lb machine by Medcalfe & Co., Ltd., who also demonstrate a redesigned version of their "Champion" apple peeler. In addition to their vegetable peelers Rowe Bros & Co., Ltd., have brought out the "Dry Mac" for extracting water and oil from potatoes before and after frying. Ashey & Co.'s rotary "Scraptofat," apart from extracting fat from meat scraps, batter scraps or waste crisps, can also be used for drying chips or crisps. A 9 cwt an hour crisp cutting machine and a crisp weighing and bagging machine are new products of the Small Power Machine Co., Ltd.



New Kelvinator 3 cu ft domestic-type refrigerator and (right) Hoover heavy duty cleaner

Among mixing machines a new light duty 80-qt model is introduced by the Hobart Manufacturing Co., Ltd. A smaller combined mixer and mincing machine is arranged for wall mounting to save space. Supplied by Fairfax Engineering, Ltd., it has a 3-gal capacity and an output of 1½ cwt an hour. The Watten dual purpose speed-mixers and emulsifiers are obtainable from W. J. Hubbard & Sons, Ltd. Another new Hobart product is a streamlined general purpose kitchen slicer produced in

In this view of the Simplex stand the new restaurant range is observed on the right



"Streamlined" general-purpose kitchen slicer exhibited by the Hobart Manufacturing Co.

stainless steel and anodized aluminium.

A tart making machine and a roll buttering and slicing machine are among a big selection of food-preparation equipment shown by Peerless & Ericsson, Ltd. A machine for buttering and slicing bread is made by Catering Machinery, Ltd., which is also showing a new coffee mill. A knife cleaning machine is made by the Avamore Engineering Co., Ltd. Another new coffee mill is accompanied on the Crypto stand by other new items, a coffee set and the "Brewmaster" insulated urn fitted with an element. Coffee making equipment is displayed by Frank V. Magrini, Ltd., and the "Cona" Coffee Machine Co. Electrically operated water boiling and coffee making apparatus is a speciality of W. M. Still & Sons, Ltd.

Besides tea and coffee making equipment G. F. E. Bartlett & Son (Metal Workers), Ltd., have a counter bain-marie and a new electrically heated food trolley. Another new food trolley appears on the Euk stand, other types being shown by Gardiner & Gulland, Ltd., Mabbott & Co., Ltd., L. G. Hawkins & Co., Ltd., and the Avamore Engineering Co., Ltd. The last-mentioned company is one of the many exhibitors of dish-washing machines which also include Hobart, Euk, Still, Avamore, Staines and Dawson models. The new Euk machines are available in two- and three-tank types with capacities of 1,000 and 2,000 pieces an hour respectively. The Staines Kitchen Equipment Co.'s unit is designed to replace an existing sink.

Hoover, Ltd., enters a new field of activity by bringing out the "Glassmaster" which is capable of washing hourly over 1,500 glasses of all types at the same time. The incorporated heater unit heats the water instantly so that the machine can be switched off when not required. The loading is 2½ kW. Another Hoover product shown for the first time is a new heavy duty cleaner, Model 912, which is claimed to work faster, clean better and last longer than previous types. The British Vacuum Cleaner & Engineering Co.'s light industrial cleaner has been redesigned. Apart from cleaners Vactric, Ltd., shows floor polishers, another type of which is demonstrated by S. C. Johnson & Co., Ltd. Floor scrubbers, polishers and carpet shampooing machines are made by R. G. Dixon & Co., Ltd.

Refrigeration equipment of all types and sizes, including frozen food storage cabinets, is exceptionally well represented. In addition to a new 18 cu ft

Display of heavy-duty cooking equipment, etc., made by the Jackson Electric Stove Co. Ltd.

refrigerator with a separate 2 cu ft frozen food compartment, Kelvinator, Ltd., show the prototype of a new 3 cu ft domestic model. This too has provision for storing frozen food. Several refinements have been made to the Pressed Steel Co.'s range of apparatus, while Marco Refrigerators, Ltd., have brought out a new 10 cu ft low temperature conservator and a new frozen food display unit. Some low-priced frozen food cabinets are among the Frigidaire exhibits. J. & E. Hall, Ltd., include representative general-purpose units of 25 and 50 cu ft and also display cabinets. Special provision for storing frozen food is made in cabinets which are produced by Hussman British Refrigeration, Ltd.

TELEVISION BROADCASTING

New Facilities at Alexandra Palace

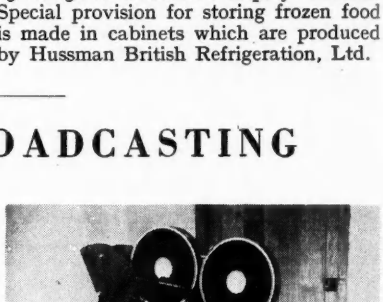
A MEASURE of the increased popularity of television as a means of entertainment in the home is the fact that, whereas in January, 1947, the number of licence holders was 11,900, this figure has now risen to more than 250,000, some 30,000 of which are held by persons residing in the Midlands area. Furthermore, the production of television receivers has been stepped up from a mere trickle in 1947 to a rate of something approaching 500,000 a year at the present time, and the manufacturers are selling as many as they can produce.

This state of affairs has led the B.B.C. to plan the extension of programme time and to improve its facilities so as to allow the extension of camera and studio technique, the production of more imaginative programmes and an extension of rehearsal time.

When we visited Alexandra Palace last week we saw evidence of these plans and had the pleasure of inspecting a new film-dubbing suite which has been equipped with apparatus designed to ensure that the films transmitted shall reach a high standard of technical excellence.

In addition to dubbing facilities, sound can be recorded in synchronism with a film camera operating in the dubbing theatre or in one of the studios. Post synchronization can be carried out as can the projection of 16 mm films and the copying of discs on to film sound tracks. In addition, "live" sound can be provided from the theatre to accompany a silent film during transmission.

The arrangements for ensuring perfect



One of the cameras developed by the B.B.C. for the recording of television programmes on film

synchronism between picture and sound are of particular interest, the projectors and sound film reproducers in the projection room being driven by Selsyn motors fed through a master Selsyn generator. Synchronism between these machines and the sound-on-film recording machine is achieved by driving the latter and the master Selsyn generator by synchronized motors which are supplied from a motor alternator set, the speed of which is electronically controlled to be independent of mains frequency. The speed can be set remotely from the recording room to operate the film machines at either 24 frames per second

(the standard speed for cinematograph film) or at 25 frames per second (the speed used for televising films).

The drawback of the sound-on-film system of recording is that it introduces a not inconsiderable delay before the composite sound and picture film is ready. This is a real handicap for television newsreels, so consideration is being given to the introduction of high-grade magnetic film recorders, whereby the negative produced by the camera is cut and televised direct, and simultaneously a fully edited magnetic film is reproduced synchronously as an unmarried print.

With the installation of this equipment the time taken to produce a newsreel will be far less than the best hitherto attained. In the meantime the non-synchronous magnetic type recorder has been installed which records in parallel with the sound-on-film machine and makes possible an immediate play-back for checking purposes only.

The tele-film recording installation consists of duplicate recording cameras facing a pair of picture monitors on which is displayed the television programme to be recorded. In the cameras there is no shutter and the film is drawn through continuously, instead of intermittently. They incorporate a system of rotating and rocking mirrors, which makes the image of the television picture follow the film in its downward progress through the gate, thus keeping the image stationary relative to the film.

Improved Method

The picture monitors have 12in tubes giving white fluorescence and a feature of the equipment is a device which effectively eliminates the line structure of the image recorded on the film, so that no interference patterns result when it is subsequently scanned for transmission.

The method adopted is to deflect the scanning spot with a sine-wave displacement in the vertical direction, the deflecting frequency being several times the maximum detail frequency of the system. The deflection amplitude is variable and it is found in practice that the line track structure is barely perceptible on the film.

In the central tele-cine room there are two film scanners made by Electric & Musical Industries, Ltd., and a temporary machine made by Cinema Television, Ltd., which will shortly be replaced by two permanent machines of the same make.

After leaving Alexandra Palace we went to Lime Grove Television Studio Centre at Shepherds Bush (which was formerly the property of the J. Arthur Rank Organization). The principal block, which was built in about 1932, contains five large film studios which are suitable for conversion into television studios and there is a total floor area of more than 28,000 sq ft.

The first stage in the conversion programme is already under way, and by the late spring it is hoped to put a 5,400 sq ft studio into service for the television Children's Hour programme. The commissioning of another studio is envisaged in the latter part of 1951, but beyond this point no detailed plans have yet been made.

Study of Technology in America

THE Ministry of Education on Monday announced that fifty more post-graduate awards for the study of technology are to be made available in the session 1950-51 at selected universities and technological institutions in the United States. The first awards under this scheme were made last year. The cost of the awards is met from funds provided by the American Economic Co-operation Administration. The aim of the scheme is to produce a small group of well-qualified men who will return to industrial posts or universities and technical colleges in this country.

The awards are tenable initially for a minimum of one year, but it is hoped they will be extended for a further year. They are open to students who hold a good honours degree in pure science or technology, who have had at least two years' industrial experience, and who are now working in industry or research associations, or are teaching in universities or technical colleges. The awards will provide for tuition fees, books and travelling expenses in the United States and a maintenance allowance of $1,800 per annum. The cost of the return passage to the United States will be met from public funds. Successful candidates will be expected to leave the United Kingdom early in September next. Full details may be obtained from the Ministry of Education (F.E. Division 1), Curzon Street House, Curzon Street, London, W.1. The closing date for applications is 15th February next.

VIEWS on the NEWS

By REFLECTOR

A CORRESPONDENT tells me that it requires a courageous official to face the Skipton branch of the National Farmers' Union, for they can be very outspoken. One such representative of the Yorkshire Electricity Board attended a meeting of the branch a few days ago and in a good-humoured way dared to point out that while farming folk professed to be anxious to obtain electricity, they were not always quite so helpful as they might be in the way of co-operating with the supply authorities. Fortunately he was armed with good news in being able to announce that the Board had produced a five-year plan for supplying 393 villages and 2,239 farms by 1954.

★ ★ ★

Diss (Norfolk) local traders, I am glad to see, are resolved to try to work amicably with the Electricity Board. The Chamber of Trade there recently had before it an application by the Eastern Board to be admitted to membership and understandably had some qualms about acceptance. The olive branch, however, was held out by a local electrical firm which recommended that the application should be granted. A practical point in favour of such action was also made by the president, who observed that it would be better to have the Board inside than outside, "for if they are inside we can at least talk to them."

★ ★ ★

The North Eastern Electricity Board tells me that I was wrong in my assumption (6th January) that the London Board was the only one which had issued a diary for 1950, and has sent me samples of the diary which it, too, has had prepared. This is a very neat little production containing a very full classified list of the members and officials of the Board and including particulars of the service centres in the five Sub-Areas and names of the Consultative Council members. Answering my surmise regarding the circulation of the London Board's diary, the North Eastern Board assures me that it is not being distributed wholesale to consumers. I am not surprised at this for there are over 700,000 of them. The diary has been sent to the chief officials of local authorities in the Area, the Consultative Council and its Committees, Chambers of Trade, and other bodies having business relations with the Board.

The information in the diary has been extracted from a very useful "Directory of Service," which contains maps of the Sub-Areas and very complete details of the Board's organization.

★ ★ ★

I came across an unusual form of electric fence the other day. It was in the window of a suburban electrical and radio dealer and comprised five strands of wire about six inches apart. On one side of the window was a card which announced: "This grille is charged at 1,000 volts and would prove fatal if touched. (For proof see indicator lamp.)" I saw the indicator lamp, a faintly glowing neon tube. As it was Sunday I could not inquire inside to discover whether the grille really had a thousand volts on it and so I am still wondering.

★ ★ ★

A monkey is in the news at Guildford. The puzzled animal, toying with electrical gadgets, is portrayed on the wall of an electrical contractor's premises in Bridge Street to illustrate the slogan "It's not wise to tinker about with electricity." The advertisement, designed by an artist at some expense and painted in colour on the brickwork, has attracted much attention, too much so in fact for the local Town Planning Committee decided that it is unsuitable "having regard to its size, design and position" and must be removed. The firm, on the contrary, contends that the advertisement is of a particularly pleasing nature and colour, and that it is of a safety-first nature. An appeal was made to the Ministry of Town and Country Planning which held an inquiry lasting two hours. It now rests with the Minister to give his verdict.

Power Factor Correction

Calculation of Original Load

By **H. NEALE***

THE customary power factor improvement scheme usually involves a straightforward calculation associated with a comparatively simple vector diagram, but in a case which occurred recently it was necessary to reverse this process for estimating purposes. Particulars of the synchronous motor were known, together with the values of initial and resultant power factors. The problem was to determine the original factory load before the addition of the synchronous motor and as circumstances precluded site investigation the value had to be calculated.

The motor was rated at 210 h.p. and had an input of 175 kW, 265 kVA at 0.66 p.f. leading, which raised the power factor of the load from 0.75 to 0.9 lagging.

Throughout the following calculations (see Fig. 1) Y_1 represents the initial load in kW; cos ϕ_1, the initial p.f.; Z_1, the initial wattless kVA; Y_2, the resultant load in kW; cos ϕ_2, the resultant p.f.; Z_2, the resultant wattless kVA; Y_3 the kW load added by the synchronous motor and Z_3 the corresponding wattless kVA.

As the power factor of the synchronous motor was known to be 0.66 and its input 175 kW the wattless component Z_3 was seen to be about 200 kVA. In calculating the wattless kVA of the original load it was known that tan $\phi_1 = \frac{Z_1}{Y_1}$ and from this Z_1 was found to equal 0.8816 Y_1. To find the kW load at the factory before the addition of the synchronous motor the equations tan $\phi_2 = \frac{Z_2}{Y_2}$,

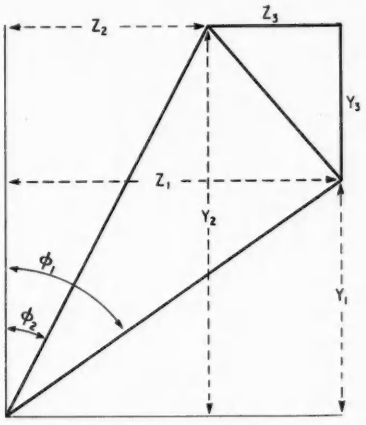
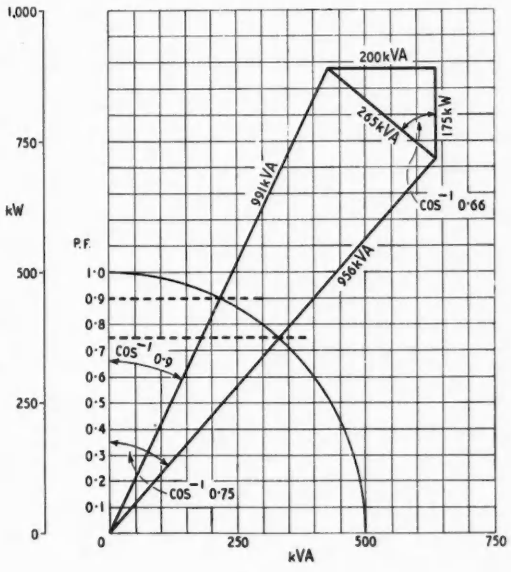


Fig. 1. Vector diagram for factory load with power factor improvement provided by a 175 kW p.f. synchronous motor

Fig. 2. Factory loading conditions before and after adding the synchronous motor for th purpose of power factor improvement



* Lancashire Dynamo & Crypto, Ltd.

$Y_2 = Y_1 + Y_3$ and $Z_2 = Z_1 - Z_3$ were combined into the form $\tan \phi_2 = \frac{Z_1 - Z_3}{Y_1 + Y_3}$. By substituting all the known values in this equation Y_1 was found to be 717 kW after which Y_2 the resultant kW after the addition of the synchronous motor was calculated as being 892 kW.

The original factory load before the synchronous motor was installed was therefore 717 kW, 956 kVA at 0.75 p.f. lagging, the new load being 892 kW, 991 kVA at 0.9 p.f. lagging (see Fig. 2, page 193).

An equation to meet the general case can be arrived at by substituting $\tan \phi_1 \, Y_1$ for Z_1 in the equation $\tan \phi_2 = \frac{Z_1 - Z_3}{Y_1 + Y_3}$, which upon simplification gives $Y_1 = \frac{\tan \phi_2 \, Y_3 + Z_3}{\tan \phi_1 - \tan \phi_2}$.

To use this simple equation it is merely necessary to assign the known values to the various symbols and as a check it is advisable to construct a rough diagram similar to Fig. 2, in which the quadrant is drawn with o as the centre and radius of 500 on the vertical and horizontal axes. The vertical axis is marked off in 10 equal divisions, representing p.f.'s from o to unity. Each kVA vector is then positioned by projecting the appropriate p.f. to the quadrant and drawing from o a line to scale through the point of intersection. If the values relating to the specific case dealt with above are inserted in the general equation the two results will be found in agreement.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents

Thermal Protection of Motors

MR. A. R. BLANCHARD in his article, "Protection of Small Motors," in your issue of 27th January, referring to the complete thermal protection of motors, says: "Fuses cannot be made with a sufficient degree of accuracy to ensure that they always blow at the right current, and even if they could they would prevent the motor being used up to the limit of its capacity . . ."

This is an interesting problem, and one can readily understand Mr. Blanchard's being of this opinion. In fact, however, this problem was, I believe, entirely solved by the late Mr. Vernon Hope, at any rate for ratings down to about 5 A, by the production of a design of fuse capable of fulfilling both these requirements, combined with high breaking capacity. This fuse, which is sold under the description "Aeroflex Long-Lag" type, has not been widely advertised, as it is of a largely specialist class, but is well known at any rate to certain motor makers.

The characteristic achieved, exemplified in the 10-A size, is approximately as follows when overloaded from cold: 10 A continuous rating, within B.S. 88 temperature rises: 12A, blows in 20 minutes; 15 A, 5 min.; 30 A, 1 min.; 60 A, 15 sec.; 90 A, 10 sec.; 120 A, 5 sec.; 150 A, 1.5 sec.; 200 A, 0.15 sec.; etc.

This succeeds in corresponding, I believe with unusual fidelity, to the thermal capacity of a motor of about 10 minutes temperature time constant, and should fit in very well with most motors of usual design.

The result is achieved by employing a fuse element similar in general to the standard "Aeroflex" type, but with a "heater" of fairly high resistivity inserted between the short-circuit necks and the low melting point control pocket. This arrangement enables a very much lower minimum fusing current to be obtained with a given size of element. Not only is a desirable fusing factor of about 1.2 obtained, but also the time-lag of the fuse, expressed in terms of full load current, is enormously increased up to the point at which the short-circuit necks operate, which is usually about 10 times full load current.

Over this part of the range, therefore, which lies approximately between stalling current and the continuous rating, thermal protection is provided which permits the

motor its full starting and overload capacity, but interrupts the circuit should this be abused, for example, by excessively frequent on-load starting. On overloads exceeding this range the short-circuit necks operate in the ordinary way, giving a high cut-off, quick action and high breaking capacity.

Further details are available from British Patents Nos. 572,342, 582,726 and 604,045. ERIC W. SUGDEN,

(Parmiter, Hope & Sugden, Ltd.

Manchester, 12.

Electric Shock Effects

IN his paper on this subject reported in your issue of 9th December, Dr. Macdonald Critchley mentions that "some people could suffer shock at high voltage and get away with it, possibly because of the tendency for arcing to take place." I think this is particularly true in hot countries. In East Africa, for instance, there have been many fatalities in the past from 230 V a.c. circuits, largely due to the fact that Africans walk about with bare feet and most houses have stone ground floors, particularly in the coastal areas, where it is excessively hot.

On the other hand, I have known of two cases of Africans making direct contact with a three phase 33,000 V overhead line earthed system who have sustained only slight injuries. In one, of which I had personal knowledge, the African climbed the wrong pole in an outdoor substation and, whilst holding an earthed channel in one hand and sitting on another with bare thighs in contact with it, he passed his wrist across a 33,000 V lead to a lightning arrestor. This occurred immediately outside the power station building in which 5,000 kW of hydro plant was running at the time.

Needless to say, the feeder switch operated in approximately 2 to 2½ seconds and the African was thrown clear of the arrestors. He was immediately brought down and his clothes, which were on fire, were removed. Within three minutes of the accident he was conscious and within ten was sitting up describing how it happened. Although he was sent to hospital to have his burns attended to (due to his burning clothes) he appeared to suffer little shock and was back at work within three weeks, seemingly none the worse for the accident, except for a deep groove burnt across his wrist where he had touched the conductor.

We had arrived at the same conclusion as Dr. Macdonald Critchley and actually carried out some experiments some time ago to find out whether grass and other foreign bodies being blown across 33 kV line insulators were likely to create an arc which would smash the insulator and we found that if a freshly cut piece of hairy grass were placed across an insulator from conductor to earth, a current of approximately 200 A could be switched on for up to 3 seconds duration from fifteen to twenty times without any apparent effect on the grass whatsoever, owing to the fact that the arc which struck through the moist air contained around the hairs on the surface of the grass, was immediately blown away in the slightest wind.

From the above we gathered that, in the case of human beings working in this climate when the whole body would be soaked with perspiration, which, being salt, has a low resistance, the arc is struck across the skin (which, in both the cases know to me, showed visible signs of tracking) and immediately blows away from the body.

Tanga, East Africa. G. E. WYATT

Broadcasting Breakdown

I WAS staggered to learn, in connection with the recent Sunday broadcasting breakdown, that the B.B.C. transmitters are not equipped with emergency power supplies to tide them over in such an emergency.

I know of no other public utility services of this nature—telephones, telegraphs and the like—which have not stand-by arrangements of a somewhat elaborate nature to ensure almost uninterrupted continuity of service in case of power supply failure, and 15-second "change-over time" to bring an emergency engine-generator into service is regarded as the absolute maximum that can be allowed. In fact, I believe I am correct in saying that the existence of "broadcast-channels" (land-lines) in the Post Office telecommunications network has been made the excuse for insistence by the Post Office Engineering Department on the provision of adequate stand-by facilities with satisfactory change-over time and, nowadays, for a change-over speed which is potentially instantaneous.

Yet the B.B.C. itself is apparently unable to take such elementary precautions in the public interest, presumably because it stands to lose no revenue by such breakdowns, whereas the Post Office, as a renter of lines and equipment, is dependent for its receipts on maximum usage of its equipment and cannot therefore afford to lose "line-time."

W. J. MITCHELL.

*New Southgate, N.*11.

[It is understood that the B.B.C. has provided stand-by diesel generator plant at all its main sound service stations, but the stations have been added to appreciably with the passage of years and it does not necessarily follow that the stand-by generating plant is of sufficient capacity to operate all the transmitters at each of the main stations.

In the case of Brookmans Park station it so happens that transmission of the Light Programme can be restored more quickly from the stand-by diesel plant than can the Home Service, but this is a purely temporary condition due to "Copenhagen Plan" changes.

Stand-by auxiliary plant of the capacity required for high-power transmitters cannot be expected to restore the service in less than from ten to fifteen minutes, for large diesel engines have to be run up and certain auxiliary plant re-powered from the stand-by source. It is one thing to provide reserve plant where only a few kilowatts are involved, but quite another when the stand-by plant capacity has to be several hundred kilowatts to be a worthwhile substitute for the mains supply.—Editors, *Electrical Review*.]

Jobs and Homes

TO many advertisements of vacant appointments, there is added a warning that successful candidates must be prepared to reside in a specified area. This is presumably so that an engineer can be available for stand-by duties.

In such circumstances, employers should make every effort to provide a house, or, alternatively, rooms, at a price commensurate with the salary offered. Prospective applicants would be well advised to consider this seriously, and if interviewed, should ask the employer what steps he has taken or will take to assist in the accommodation problem.

Many engineers accept appointments in strange districts where they are entirely unaware of the housing position, only to find that their chances of renting a house are nil. Until houses are plentiful, then, it is only fair that before imposing residential conditions, the employer should be able to offer the applicant decent living accommodation or else the applicants are entitled to say in as many words—"No accommodation, no stand by!" and then proceed to apply for a post where the employer has the interests of his staff more at heart.

FAIR PLAY.

Bridlington.

COMMERCIAL TRAVELLERS' SCHOOLS

THE festival dinner of the 104th maintenance appeal of the Royal Commercial Travellers' Schools was held on Friday last at Grosvenor House, Park Lane, London, Mr. Leslie Gamage (vice-chairman and joint managing director of the G.E.C.), the Appeal President, presiding. The principal guest was Air Chief Marshal Sir Philip Joubert, K.C.B., C.M.G., D.S.O., who was accompanied by Lady Joubert. Sir Philip, in proposing the toast of the Schools, referred to the importance of commercial travellers and the valuable work of the schools. Mr. J. Freeman Dunn, chairman of the board of management, in response also spoke of the value of the schools in fostering a high moral code.

He referred to a scheme for extending and modernizing the schools which would involve a considerable outlay.

Mr. A. H. Carpenter, the secretary, announced that the result of the Appeal for the year was £38,411 and Mr. Gamage and the Hon. Mrs. Leslie Gamage had promised to make this total up to £39,000. He mentioned that the Electrical Trades' Commercial Travellers' Association had contributed over £1,100.

Mr. T. S. Sara, deputy chairman of the Board of Management, proposed the toast of the Appeal President, and Mr. Gamage in responding said that the Hon. Claude Hope-Morley, the treasurer of the schools, had agreed to make the total of the Appeal £40,000. Mr. Gamage proposed the toast of the vice-presidents, stewards and helpers of the Appeal to which J. E. Winskill (national chairman, United Commercial Travellers' Association) and Mr. T. W. Heather (director, G.E.C.) responded.

Fuel Research

Some of the Ministry's Development Projects

SOME of the research projects now being conducted by the Ministry of Fuel and Power were outlined at a Press Conference last week, over which the Minister presided. Dr. H. Roxbee Cox, chief scientist to the Ministry, explained that in each case the objective was the collection of data which could assist the choice of the most appropriate machines to use available fuel more economically. For instance there is the experimental underground gasification of coal which has already been referred to (*Electrical Review*, 9th Dec., 1948).

Heat Pumps

The Ministry also desires to investigate more fully the possibilities of the heat pump for heating and cooling large buildings. Calculations made in the Chief Scientist's Division are claimed to have shown that there is an economic advantage in driving the heat pump by gas engines. Accordingly, surplus Merlin aircraft engines are being converted (Muntz) to run on town's gas, while their superchargers are being modified to function as compressors. By this means it is hoped to demonstrate that a heat pump of large capacity, built on light engineering methods, can be an economical proposition. This development work is well advanced and it is proposed, with the collaboration of the London County Council, to employ this heat pump for heating part of the new Concert Hall now being built on the South Bank site of the Festival of Britain, 1951.

Work is proceeding on the burning of residual oil in gas turbines in collaboration with the Admiralty and the National Gas Turbine Establishment. Work on the use of solid fuel in gas turbines is the responsibility of the Ministry, which is at present mainly interested in their use for generating electricity and railway locomotives, which are regarded as two of the most important parts of the Division's work. Three methods are being investigated. First, there is the direct internal combustion of pulverized coal. Arrangements have been completed (English Electric Co., Ltd.) for the construction of a 2,000 h.p. set on this principle, in association with the Fuel Research Station and the British Coal Utilization Research Association. At the former experiments are in progress with two forms of combustion chamber, while the latter is concerned with another form of furnace. This work will be integrated with other research (C. A. Parsons & Co., Ltd.) into the internal combustion of coal in an existing 500 h.p. gas turbine.

Secondly, there is the internal combustion of coal, arrangements for the development of which (John Brown & Co., Ltd.) will make use of another existing 500 h.p. gas turbine. Thirdly, there is the two-stage internal combustion of producer gas made from coal at, or above, the pressure required by the turbine. For a 2,000 h.p. set (Metropolitan-Vickers Electrical Co., Ltd.) producers are being developed by the Incandescent Heat Co., Ltd., and the Burnley branch of Joseph Lucas, Ltd. In collaboration with the Scottish Department of Agriculture a survey of peat bogs is proceeding with a view to the possible consumption of peat in gas turbines. The closed-cycle experiments (John Brown & Co., Ltd.) are being supervised by the Scottish Home Department in conjunction with the North of Scotland Hydro-Electric Board. The open-cycle experiment (Ruston & Hornsby, Ltd.) is being organized by the Ministry and the steam generated by the drying of wet peat would pass into the turbine and enhance its power.

Preheated Methane

Preliminary negotiations are proceeding for experiments with preheated methane-in-air as a fuel for gas turbines. The most attractive engine for this purpose would be one capable of burning at the same time firedamp and coal fines, or other cheap fuel, available at the same colliery site. Power so generated would

be available to replace that furnished by normal colliery boilers. Plans are proceeding in collaboration with the National Coal Board.

Reference was also made to the E.R.A. wind power experiments.

An investigation of the efficiency of fuel consumption in twelve major industries is proceeding as is also a survey of the economy with which fuel is used for drying processes in 25 industries. The mobile testing unit employed for these purposes has brought about an average 15 per cent fuel saving during the past year in factories with an aggregate annual consumption approximating to 100,000 tons of coal and 5,000 tons of oil. Three additional similar testing units are to go into service on a permament footing.

Batti Wallahs' Society

THE history and development of television was the subject of an interesting talk given by Mr. T. C. Macnamara at last week's luncheon of the Batti Wallahs' Society. Mr. Macnamara, who is head of the Planning and Installation Department of the B.B.C., has been associated with television from its earliest days, and some of his reminiscences were amusing in the light of present-day practice. He referred to the original system of the late Mr. J. L. Baird—the "father of television"—and the subsequent installation at Alexandra Palace of the Baird and Marconi-E.M.I. systems.

All activity in television development ceased during the war, and consequently much leeway had to be made up when the service was resumed. He said that the B.B.C. had a number of important schemes in its programme of development, its objective being to provide a service which would cover the whole of the country. The programme of development was costly, and only by a considerable increase in the number of television viewers was it economically possible.

The existing studios at Alexandra Palace were poor, but they had produced a facile technique which would be useful in future studio production. Before studio improvements could be carried out, however, the B.B.C. had had to concentrate on improvements in outside broadcast apparatus. Considerable improvements in design had been accomplished, and unwieldy apparatus had been superseded by more compact and mobile equipment. Another development was the new sensitive camera for studio production, which increased the depth of focus.

Home television receivers were "built down" to a price, and the B.B.C. had to watch carefully that new developments did not increase the cost of receivers. It had no intention of doing anything which would make receivers out of date for years to come. Among interesting possibilities were coloured television and telefilm recording.

Mr. A. H. Hughes, the "Mate," announced that the next luncheon would be held on Wednesday, 22nd February, instead of the last Thursday in the month, which was General Election date. He asked members who required tickets for the ladies' night on 13th March to notify him as early as possible.

"The Electrical Wholesaler"

A PERIODICAL bulletin produced by the Electrical Wholesalers' Federation has been replaced by a quarterly journal, "The Electrical Wholesaler," which is not confined to the membership of the Federation. The first number, dated January, is very well produced and illustrated; its 92 pages are about equally divided between advertisements and editorial matter. Among the articles, which are mainly of wholesaling interest, is one "In Support of the Wholesaler," by "A Prominent Switchgear Manufacturer," and another on accountancy and business control, by Mr. William E. Wood, of the Lamson Paragon Supply Co. Reports include accounts of the jubilees of the Sun Electrical Co. and the Sloan Electrical Co., and a report of the meeting of Federation members at Gleneagles. There is also an appeal on behalf of the Electrical Industries Benevolent Association by Mr. E. C. Holroyde, the Association's president. Personal and financial notes and book reviews are other features.

Cooling Tower Experiments

PROSPECTS of reducing the escape of moisture from cooling towers at power stations are promised by results of preliminary investigations by the British Electricity Authority. An advance is believed to have been made by the employment of a new method of eliminating excessive precipitation. Tests which have recently been carried out on a cooling tower fitted with special equipment have yielded results so far encouraging that the Authority has decided to extend the experiment to two other towers and envisages the modification of several others as manufacturing resources make this step possible. In the meantime, the Authority has also under construction a small-scale model cooling tower for further investigation of the problem by its research department.

Assembly department, showing many finished items of gear including fuse switchboards, lighting boards, chain operated oil immersed pole isolators, motor control cubicles and synchronizing panels

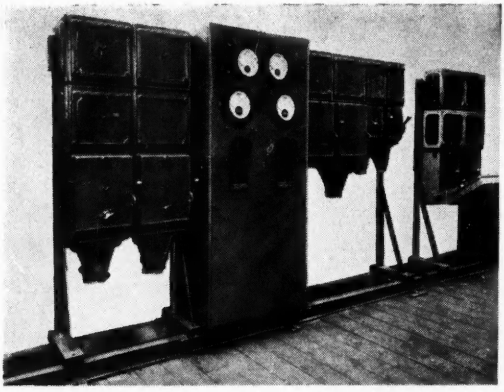
Unit Type Metal-clad Industrial Equipment

As a result of work for the past four years on the production of electrical control gear for oilfields and refineries in the tropics, the Electro Mechanical Manufacturing Co., Ltd., has developed a complete range of unit type industrial metal-clad switchgear suitable for use under the most exacting climatic conditions in any part of the world.

The equipment is being made at Scarborough where the company was established in 1943 as a subsidiary of the Yorkshire Switchgear & Engineering Co., Ltd., to fulfil Admiralty contracts for radar apparatus. It was on the completion of these contracts in 1946 that the company, with Mr. J. Whitehead as general manager, began the manufacture of l.v. switchgear.

Hitherto about 90 per cent of the output has gone abroad, mainly to oilfields, to such places as Venezuela, Paraguay, Equador, Colombia, Trinidad, the Netherlands East Indies, Sarawak, Brunei, Persia, Kuwait, Egypt, Palestine and South Africa. Thanks to the experience gained in the production of the "Yorkshire" IVIO range of metal-clad switchgear and to the availability of a well-equipped climatic testing station at Leeds, the apparatus has stood up satisfactorily to every test under actual operating conditions. Although it was intended originally for tropical use, the design is such that it is equally suitable for use in other parts of the world where conditions render it necessary or desirable for somewhat special care to be taken. In particular is it applicable to such situations as steel and chemical works and to out-

(A) Six-way lighting box for industrial service, fitted with busbars, and one 15 A d.p. rotary switch and one 25 A fuse per way. (B) Internal view of 300 A t.p. & n. fuse switch with three fuses in circuit and three spares



Typical "Y" fuse switchboard controlling two incoming 40 kW alternator sets each with automatic voltage regulators and metering facilities feeding through to the outgoing circuit

door or indoor sites on railways and in shipyards, factories, substations, etc.

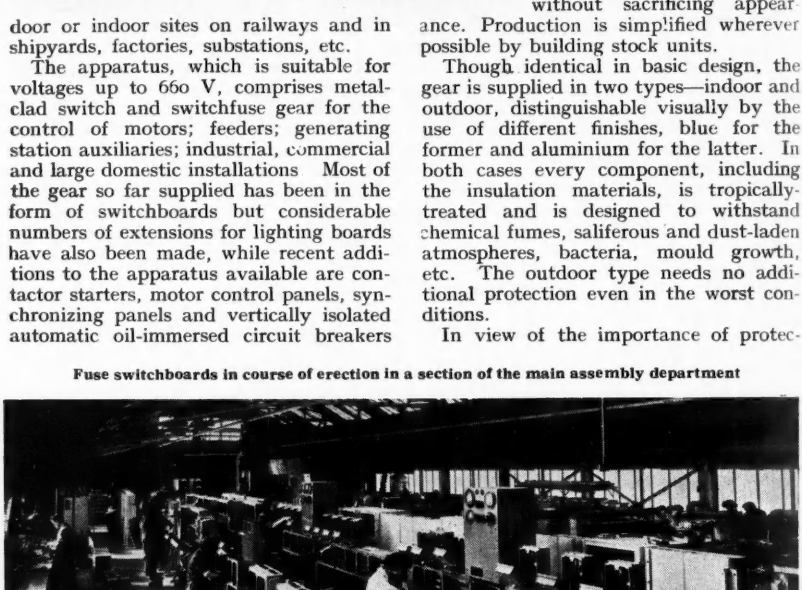
The apparatus, which is suitable for voltages up to 660 V, comprises metal-clad switch and switchfuse gear for the control of motors; feeders; generating station auxiliaries; industrial, commercial and large domestic installations Most of the gear so far supplied has been in the form of switchboards but considerable numbers of extensions for lighting boards have also been made, while recent additions to the apparatus available are contactor starters, motor control panels, synchronizing panels and vertically isolated automatic oil-immersed circuit breakers of up to 800 A capacity.

The standard range of fuse-switches covers ratings of 30 A, 60 A, 160 A, 300 A, 500 A and 800 A, though units of up to 1,200 A capacity have been supplied. The adoption of a limit system of construction renders it possible to build up switchboard assemblies of exceptional neatness and to extend them later with ease and without sacrificing appearance. Production is simplified wherever possible by building stock units.

Though identical in basic design, the gear is supplied in two types—indoor and outdoor, distinguishable visually by the use of different finishes, blue for the former and aluminium for the latter. In both cases every component, including the insulation materials, is tropically-treated and is designed to withstand chemical fumes, saliferous and dust-laden atmospheres, bacteria, mould growth, etc. The outdoor type needs no additional protection even in the worst conditions.

In view of the importance of protec-

Fuse switchboards in course of erection in a section of the main assembly department



tive measures, the company's facilities for providing various metal finishes are particularly interesting. In addition to the normal paint spraying section and electroplating departments where nickel, cadmium, silver and tin finishes can be applied, there are on the premises shot blasting and metal-spraying rooms where, after the removal of rust, ferrous metal can be coated with a film of pure zinc. A good deal of care has been taken to secure an attractive appearance. Circuit labels are in stainless steel. The majority of the enclosing casings are constructed of special fine grain aluminium castings.

Besides the equipment mentioned the company also manufactures the well-known "Yorkshire" porcelain end strain and service fuse for rural distribution work. These simple units, of which 2¼ million have been supplied to all parts of the world, are available in three sizes and in three types.

CANADIAN POWER RESOURCES

Constructional Activity in 1949

ALTHOUGH no large new plants were brought into operation in Canada last year hydro-electric construction was very active and 479,900 h.p. was added to the generating capacity of the country by way mainly of additions to existing developments. The total hydraulic installation in Canada, including the new province of Newfoundland, was thereby raised to 11,622,668 h.p. A number of new schemes are in an advanced stage. Definite commitments cover a total of over 2,000,000 h.p. (including 1,500,000 h.p. scheduled for the next two years) and a larger amount is subject to surveys, investigations and long-range planning. During the year primary power consumption continued to grow in practically all sections of the country, the demand being 3 per cent higher than in 1948.

The following is a brief record of the progress during the year detailed in the annual review of the Dominion Water and Power Bureau, Department of Mines and Resources:—

British Columbia.—With a total addition of 228,300 h.p. in 1949 British Columbia ranked highest among the provinces. This included two new 62,000 h.p. units at the Bridge River plant of the British Columbia Electric Railway Co., raising the capacity to 186,000 h.p.; the plant is designed for an ultimate installation of ten units. Surveys are being conducted at Jones Lake, about 75 miles east of Vancouver, covering a development of about 70,000 h.p. under a head of 2,000ft. At the John Hart plant of the British Columbia Power Commission on the Campbell River, Vancouver Island, the third and fourth units (28,000 h.p. each) have been brought into operation and an initial installation of 30,000 h.p. at Whatshan Lake, in the south central part of the province is expected to be in operation late this year. On the Kootenay River, the Consolidated Mining and Smelting Co. of Canada, Ltd., completed the installation of a third 37,000 h.p. turbine in its Brilliant plant.

The Aluminium Co. of Canada, Ltd., has continued its intensive investigations toward the establishment of a high-head plant of large capacity on one of the coast inlets by diverting water from the headwaters of the Fraser River by a tunnel through the Coast Range.

Yukon.—Investigations were carried out by the Dominion Government in connection with a possible development on the Mayo River, Yukon Territory, to serve the silver-lead mines in that area.

Alberta and Saskatchewan.—No new hydro-electric plants were completed in 1949 but Calgary Power, Ltd., has achieved substantial progress at its Spray Lake development in the upper Bow River basin. The overall scheme includes a plant of 62,000 h.p. under 900ft head at Spray Lake, 3,600 h.p. under 50ft head at Three Sisters Falls, and ultimately the Rundle plant of 23,000 h.p. Rural electrification is being pressed forward in Alberta with Calgary Power, Ltd., adding about 2,700 new farms during 1949; about 8,000 farms in the province are now served.

In Saskatchewan, water-power development is at present limited to the northern mining areas, the southern portion of the province being served by fuel-power plants.

Manitoba.—The extension of the powerhouse of the Winnipeg Electric Co., at Seven Sisters Falls, on the Winnipeg River, to allow for the ultimate installation of six 37,500 h.p. units was completed, as was also the raising of the head to the final limit of 66ft. The present total plant capacity is 150,000 h.p. A 114,000 h.p. development at Pine Falls on the Winnipeg

River was undertaken by the Manitoba Government early in the year.

The Manitoba Power Commission carried out an extensive programme of rural extensions involving 268 miles of 66 kV lines, 257 miles of town lines and 3,550 miles of farm lines. Service was provided to an additional 4,500 farms bringing the total of electrified farms in the province to 17,000.

Ontario.—The Hydro-Electric Power Commission has under way a tremendous programme of construction embracing the following projects:—Des Joachims, on the Ottawa River about 40 miles above Pembroke; three of the eight 60,000 h.p. units are expected to be in operation next summer. Chenaux, on the Ottawa River at Limerick Island, about ten miles north of Renfrew; of the eight 20,000 h.p. units two should be ready at the end of the year. La Cave, also on the Ottawa River, about seven miles above Mattawa; there will be six 32,000 h.p. units with provision for two more; the first unit should be ready early in 1952. Pine Portage, on the Nipigon River, 21 miles upstream from the village of Nipigon; the initial installation of two 40,000 h.p. units is scheduled for operation next summer. Tunnel, on the Mississagi River, near Thessalon; two 28,000 h.p. units are being installed and the station should be in service by the middle of 1950.

In addition to its hydraulic projects the Commission is proceeding with the construction of a steam generating plant at Windsor with an ultimate capacity of 240,000 kW; two 60,000 kW units are scheduled for the autumn of 1951. Preliminary work was also begun on a plant to be erected in the Toronto Eastern Harbour area where two units, having a total capacity of 20,000 kW are planned for initial installation. In the Southern Ontario System work has begun on the huge task of changing the distribution from 25 c/s to the standard 60 c/s.

Quebec.—The Shawinigan Water and Power Co. completed its development at Shawinigan Falls on the St. Maurice River by bringing into operation the second and third 65,000 h.p. units; the total plant capacity is now 195,000 h.p. Work is proceeding on the company's new 390,000 h.p. development at La Trenche Rapids, on the upper St. Maurice River.

The Quebec Hydro-Electric Commission, through its subsidiary the Beauharnois Light, Heat and Power Co., is constructing its No. 2 power-house at Beauharnois on the St. Lawrence River; the plant will have an ultimate capacity of 600,000 h.p. but present plans call for three 55,000 h.p. units by 1951 and three additional units by 1952.

Newfoundland. — Considerable development has already taken place on the island, where there are 18 plants with a total capacity of 272,050 h.p. The larger plants serve principally the pulp and paper industry.

HUTCHINGS POWER STATION

FOR its first year of operation the initial section of Hutchings power station, which runs in parallel with the 210 MW Tait station of the Dayton Power and Light Co., U.S., is reported in the *Electrical World* to have returned a thermal efficiency of 31.3 per cent on kWh generated. The main installation, laid out on the unit principle of one turbine—one boiler, comprises two 60 MW, 3,600 r.p.m. turbo-alternators —the first installed in July, 1948, and the second (erected in 27 days) in March, 1949— and two 500,000 lb semi-outdoor boilers.

Steam conditions at the superheater stop valve are 1,350 lb/sq in and 950 deg F. Fired with pulverized coal having a calorific value of 13,045 B.Th.U./lb, the boilers showed an efficiency of 88.9 per cent, the coal rate being 0.836 lb/kWh and the heat rate 10,904 B.Th.U./kWh. The single stack is 250ft high.

Designed steam conditions for the turbines are 1,250 lb/sq in and 950 deg F and 1.5in Hg (abs) back pressure. Each unit requires condensing water at the rate of 43,000 gal/min from Miami River. The steam rate for the year was 8.68 B.Th.U./kWh. The 12.5 kV alternators are ventilated with hydrogen at 0.5 lb/sq in, capable of being raised to 15 lb/sq in, with cooling by well-water at 56 deg F. Excitation is at 250 V from one 200 kW amplidyne controlled motor-generator for each set, without spare, but later to be connected to common exciter busbars. Switching is on the 69 kV side of banks of single-phase transformers (without spare) which are to be equipped with forced air cooling. The station is ventilated with forced air and the electrical control room is completely air conditioned.

The ultimate capacity of Hutchings station (in 1951) will be 240 MW. Two further 60 MW units are to be installed, but with steam at 1,450 lb/sq in and 1,000 deg F with reheating to 1,000 deg F, which is expected to reduce the heat rate to 1,000 B.Th.U./kWh sent out. At 55 per cent load factor the net savings are expected to produce a return of 25.4 per cent on the additional expenditure incurred. The transformer associated with the fourth alternator will be a three-phase unit.

Pole Erection

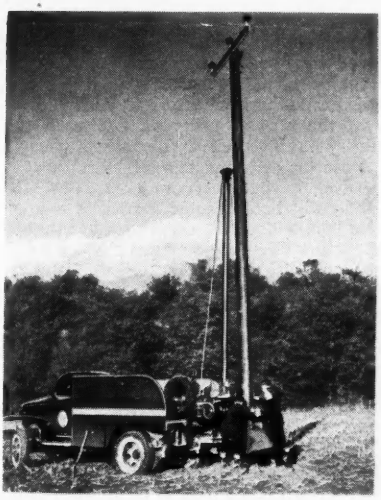
Excavator with Lifting Jib

By J. HARLEY, A.M.I.E.E.

IN the Midlands a self-contained machine is now being used for erecting overhead power lines. This machine, which is of American origin, is the Chevrolet excavator for pole-hole boring and pole erecting. It not only bores the pole-hole but it is fitted with a jib to enable it to lift the pole from the ground and drop it into the hole before the machine is moved on to the next position.

The machine is handled by two men. One sits in the driver's seat and operates the motive power while the other stands at the rear and operates the drilling auger and the jib. Two more men are usually required to shovel the loose soil away from the edge of the pole during boring and to help handle the pole by fastening the wire rope to it and guiding the butt into the hole. All that remains to be done then is to twist the pole (previously fitted with its cross-arm), line it in, backfill and ram the soil with specially shaped rammers.

Stay holes and holes for earth plates are also bored with the machine, so that the saving in time is considerable. Large stones and boulders, however, can slow



Top: Chevrolet pole erector in use. The gear for boring the holes is situated at the rear of the vehicle

Centre: Raising the pole into position by means of the jib

Right: Boring a stay hole. The two men with shovels are preventing loose soil from dropping back into the hole

the pace down as they have to be removed by hand. It is possible to bore through the softer types of rock and shale and, although these conditions also slow down the rate of progress, a stretch of country having such holes can be covered in a matter of hours instead of the days absorbed by the usual methods.

It is still necessary to excavate a few holes by hand where the machine cannot get to the pegged position, but as it is equipped with four-wheel drive it can go almost anywhere. The number of holes which can be bored in a day naturally depends upon distance from base, type of country, difficulties of access and so on. However, taking the rough with the smooth, fifteen or sixteen holes per day is usual. In bad conditions it might only be possible to manage six or seven, and in good conditions thirty or more can be bored. During the first week of its use in the Shrewsbury district, twenty-two holes were bored and twenty-two poles erected in a normal working day, much to the gratification of the enthusiastic construction gang.

The dismantling of overhead lines is also a simple matter. A hole is bored alongside the stay and the jib does the rest. As a rule the pole is pulled straight out "by the roots." The dismantled conductors are wound on to a collapsible drum and bound with wire for storing.

NEW BOOKS

Design of Direct Current Machines. By L. Greenwood, M.I.E.E., M.I.Mech.E. Pp. 222; figs. 211; index. Macdonald & Co. (Publishers), Ltd., 43, Ludgate Hill, London, E.C.4. Price 25s.

The general adoption of the a.c. system of distribution has not led, as might have been supposed, to the obsolescence of the d.c. motor; actually the use of machines of this type tends to increase, mainly owing to the ease of speed control they afford, and to the extent to which their operating characteristics can be controlled by the designer. It is because of this that there has arisen a need for an up-to-date treatise on the design of d.c. machines and Mr. Greenwood has met this need very successfully in the book under review. The style of treatment is thoroughly practical and no space is taken up by a recapitulation of the basic theory expected to be known by the reader.

The author first considers the general principles of the design of the magnetic circuit and of armature windings and deals very fully with armature reaction and commutation. Details of design of field windings, armature construction, the heating of armatures and commutators and the general features of mechanical construction are the subjects of further chapters. The author then works out the complete design of a 67 h.p. compound wound motor in all its details. Five completed design sheets for machines of various types are included with explanatory comments for the reader's study. There are also useful appendices on fan design and on the use of saturating liners.

Mr. Greenwood's book is a very good one; it is admirably illustrated and incorporates a number of curves based upon standard design formulæ. It will be found most useful by senior students specializing in the subject and by junior designers.—G. W. S.

Welding Dictionary: French - German - Spanish - English. Compiled and Edited by R. N. Thompson and G. Haim. Pp. 234. The Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E.1. Price 21s (postage 6d).

The purpose of this dictionary is to enable the welding engineer and research worker possessing sufficient knowledge of these languages, to understand foreign technical publications. In addition to terms specifically related to welding, many other expressions pertaining to electrical and mechanical engineering and to metallurgy are included, as the ready translation of such terms is essential for the appreciation of any welding literature. The dictionary is divided into four parts: French, German, Spanish and English, the English part being treated as a key glossary with equivalents in the other three languages.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Council of the Institute of Fuel announces that **Mr. J. F. Ronca,** O.B.E., will succeed Dr. D. T. A. Townend as president in October next. Mr. Ronca has served since May, 1945, as the honorary secretary of the Institute, having previously been a member of Council since 1933. The award of the Melchett Medal for 1950 has been made to **Prof. R. J. Sarjant,** O.B.E., Professor of Fuel Technology at the University of Sheffield.

Mr. Raymond Berry (chairman and managing director of Berry's Electric, Ltd.) has succeeded Mr. F. G. Nesbitt (Simplex Electric Co., Ltd.) as chairman of the B.I.F. Electrical Exhibitors' Committee. The new vice-chairman is **Major Percy McGeoch** (Wm. McGeoch & Co., Ltd.).

Mr. J. F. Magee, engineer representative, London, of the Sydney County Council electricity undertaking, has now returned to this country from Sydney after investigation of Pyrmont, Bunnerong and Lugarno problems.

The **South Western Electricity Board** has recently completed its District organization by the setting up of five Districts in the Cornwall Sub-Area, replacing the seven which had, as a temporary measure, been based mainly on pre-nationalization arrangements. Under the new organization added responsibility will be given to the District managers, and the reduced number of Districts will provide a more convenient administrative division of the Sub-Area. The following have been appointed as District managers: West Cornwall: Mr. H. R. C. White, A.M.I.E.E.; Central Cornwall: Mr. J. W. Roberts, A.M.I.E.E.; North Cornwall: Mr. A. H. Warren, A.M.I.E.E.; South Cornwall: Mr. J. E. Flower, A.M.I.E.E.; East Cornwall: Mr. J. H. Dent, A.M.I.E.E.

Before nationalization Mr. White was chief distribution engineer to the Cornwall Electric Power Co., and latterly he has been the Board's Sub-Area engineer. He recently returned from the United States, where he was a member of the electricity supply productivity team. Messrs. Roberts, Warren and Dent were also formerly with the Cornwall Electric Power Co., subsequently becoming managers of the Board's temporary Districts. Mr. Flower was chief engineer and manager to the St. Austell and District Electric Light and Power Co., Ltd., and since nationalization has continued to serve at St. Austell as the Board's district manager.

Mr. J. U. Vass, M.B.E., J.P., M.I.Mech.E., who for the past 28 years has been works manager of the Fraserburgh factory of the Consolidated Pneumatic Tool Co., Ltd., has retired from that position, but remains a director of the company. He is succeeded by **Mr. A. M. Vass** as works manager at Fraserburgh.

Mr. C. H. Downing has resigned from the board of British Electric Meters, Ltd., and British Electric Meters, Ltd., has accepted the termination of the agency agreement held by Modern Electric Power Products, Ltd., of which company Mr. Downing is managing director.

Mr. E. G. Phillips, O.B.E., M.I.Mech.E., M.I.E.E., was installed as chairman of the East Midland Area of the Institution of Mechanical Engineers on 31st January.

Mr. G. F. Sargent, late buyer for Electronic Transmission Equipment, Ltd., has been appointed buyer for Cyc-Arc, Ltd.

Mr. G. M. D. Shaw, B.Sc.(Eng.), M.I.E.E., district engineer for the Thurrock District of the Eastern Electricity Board

Recently appointed District managers of the Cornwall Sub-Area of the South Western Electricity Board. Left to right: Messrs. A. H. Warren, J. E. Flower, J. W. Roberts, H. R. C. White and J. H. Dent

(Essex Sub-Area), has been elected a member of Standing Committee of Convocation of the University of London.

The Electrical Association for Women has appointed **Miss Marjorie E. Bailey,** B.Sc. (Hons.), as head of the Housecraft Department. Miss Bailey is a graduate of King's College of Household and Social Science, and also holds the teachers' diploma of the University of London. She has had a varied experience in the teaching and social aspects of home economics in England, Canada and Italy, having taught in secondary modern and grammar schools and in evening institutes, spent a year at a high school in Vancouver, B.C., and been a technical adviser to the Londers' Meal Service and a nutritionist with UNRRA in Italy.

Miss M. E. Bailey

Miss Gladys Parker, a 20-year-old trainee demonstrator at the Burnley Service Centre, and **Mr. H. Palfrey,** assistant sales superintendent, who together designed the display which won the recent North Western Electricity Board annual showroom window display competition, were on 23rd January presented with the challenge cup and a replica by Sir Joseph Hallsworth, M.A., chairman of the board.

Mr. R. W. Kennedy, who has been editor of the *Electrical Contractor & Retailer*, the official journal of the E.C.A., for the past 24 years, is retiring at the end of this month. Mr. Kennedy began his journalistic career as a sub-editor of *Electrical Industries* in 1905, he first contributed to the *Electrical Contractor* in 1908. During the 1914-18 war he was deputy inspector of non-metallic materials with the Air Ministry. He joined the E.C.A. in 1926 and was later the author of "Electrical Housecraft."

Mr. C. P. Spurr, advertising and publicity manager of the E.C.A. and allied organizations, will succeed Mr. Kennedy as editor of the *Electrical Contractor & Retailer*.

Two employees of the General Electric Co., Ltd., completed fifty years' service with the company in January. They are **Mr. L. W. Barsdorf,** A.M.I.E.E., A.M.Amer. I.E.E., of the Switchgear and Instrument Department, and **Miss E. Churchill,** of the company's Invoice Department. Miss Churchill, who joined the Invoice Department when the company's head office was at Queen Victoria Street, is the first lady of all G.E.C. London establishments to complete fifty years' service with the company.

Mr. L. W. Barsdorf is technical adviser to the Switchgear and Instrument Department at head office. He started his career with the G.E.C. as a junior draughtsman working on the design of h.v. and l.v. switchgear at Salford Electrical Instrument Works. Five years later he joined the outdoor staff in charge of the erection of h.v. and l.v. plant. In 1907 he was transferred to Witton and continued there until 1911 when he went to the head office. During recent years he has become noted for his work on lighting apparatus, airfield control and lighting equipment, and electronic instruments and their applications. He has combined these activities with his duties as assistant manager of the company's Switchgear and Instrument Department.

Mr. Leslie Gamage, vice-chairman and joint managing director of the General Electric Co., Ltd., made a presentation on 3rd January, to both Miss Churchill and Mr. Barsdorf on behalf of the company.

The General Electric Co., Ltd., announces the appointment of **Mr. G. L. Butler** as manager of the company's Liverpool branch in succession to the late Mr. F. Ridout. Mr. Butler started his career with the company thirty-eight years ago in the Accounts Department of the Manchester branch. After a break during the 1914-18 war he returned to Manchester in 1919 and held various appointments there, including managership of the Wire and Cable Department and later the Fittings Department. He transferred to the Liverpool Branch as assistant manager in 1931.

Mr. G. L. Butler

The **Swansea E.A.W. Branch** celebrated its twenty-first birthday on 23rd January. At the birthday dinner a welcome was given to Dame Caroline Haslett, E.A.W. Director, and to Lady Hacking, president of the West Kent Branch, by the Mayor of Swansea, Councillor R. Gronow, who was accompanied by the Mayoress. The Toast of "Electrical Education" was proposed by Dame Caroline Haslett and Principal Fulton, of Swansea University College, replied. "The Future of Swansea" was proposed by Councillor Sir William A. Jenkins, J.P., the response being made by Lady Hacking. The president's address was given by Mrs. Rowland James, and other speakers were

the branch chairman, Mrs. Trevor Rees, the hon. secretary Mrs. W. E. Johnstone, and Mrs. Haines.

Messrs. F. E. Regan and **R. A. Yapp** have been appointed directors of Bepco Canada, Ltd., a subsidiary company of Bruce Peebles & Co., Ltd., Crompton Parkinson, Ltd., the Harland Engineering Co., Ltd., and Lancashire Dynamo & Crypto, Ltd. Both Mr. Regan and Mr. Yapp served their apprenticeship and worked with one of these British companies before going to Canada.

Children of employees of **Benjamin Electric, Ltd.,** numbering 220, were present at the Tottenham clubrooms of the Benjamin Social and Athletic Club for the annual children's party on 21st January. Tea was served by the manageress of the canteen and her assistants, together with volunteer club members. The usual paper hats, novelties, etc., were distributed, and a stage show by Lovewells Juveniles followed. There was a talent contest for which many prizes were awarded. At the conclusion, each child received fruit and a bag of sweets.

Mr. J. W. Lapthorn, manager of the order department of W. T. Henley's Telegraph Works Co., Ltd., retired from the company's service on 25th January, after completing nearly 51 years with Henley's. His colleagues in the company presented him with a television set as a token of esteem, the ceremony being performed by Sir Montague Hughman, chairman of the Henley organization. **Mr. E. S. Bantin** succeeds Mr. Lapthorn as manager of the order department.

Presentation to Mr. J. W. Lapthorn. Left to right: Mr. W. F. Bishop, Dr. P. Dunsheath (directors); Mr. J. W. Lapthorn; Mr. H. M. Jacob, Mr. F. W. M. Anderson (directors); Sir Montague Hughman (chairman); and Mr. W. McClelland (director)

In our last issue we reported the appointment of **Mr. K. Fraser,** chairman of W. J. Fraser & Co., Ltd., as president of the British Engineers' Association. We now reproduce his portrait herewith.

Mr. K. Fraser

On 20th January last the directors of **Wm. Sanders & Co. (Wednesbury), Ltd.** gave a dinner to 250 employees at the Town Hall, Wednesbury. Mr. E. B. Manion, chief designer, proposed the toast of the directors and referred to the large number of employees of long service with the company. He presented to Mr. R. Nicholls (director) a miniature violin, bow and resin, and to Mr. G. H. Bayliss (director) an oversize pipe. The directors presented engraved gold watches together with illuminated vellum to employees with twenty-five years' or more service, and three employees with forty-three years' service were each presented with a television receiver.

OBITUARY

Mr. K. Boorn.—The death occurred on 21st January, at the age of eighty, of Mr. Kennett Boorn, who had been employed by Johnson & Phillips, Ltd., for over sixty-two years, being foreman of the tape dipping and impregnating shop for forty-seven years.

Mr. H. W. Kent.—The death occurred on 29th January at the age of 76 of Mr. Harold Willison Kent, director of Davies, Kent & Stewart, Ltd.

Mr. A. Stuart Cachemaille, chartered patent agent, died on 24th January at his home at Wraysbury, after a short illness; he was seventy-four years of age. Mr. Cachemaille was educated at Manchester Grammar School and West Ham Municipal College. He joined the British Westinghouse Electric & Manufacturing Co., in 1899, and later took charge as joint manager of the Patent Department of that company, becoming manager on the change of name to Metropolitan-Vickers Electrical Co., Ltd., and continuing in that capacity until his retirement at the end of last year. From 1934 he had also been head of the Patent Department of Associated Electrical Industries, Ltd., and had controlled the

patent interests of all the companies of the A.E.I. Group. Mr. Cachemaille became a Fellow of the Chartered Institute of Patent Agents in 1908 and was elected president of that body in 1931. He was cremated at Golders Green on 28th January.

Mr. A. Steele.—The death occurred on 22nd January, after a short illness, of Mr. Alexander Steele, manager of the Glasgow branch of Siemens Electric Lamps and Supplies, Ltd. Mr. Steele, who was in his sixty-seventh year, joined Siemens Brothers Dynamo Works, Ltd., in 1911 as assistant in the Supply Section at Glasgow and in 1914 became manager of that Department. In 1920, when the Lamps and Supplies Co. was formed, he was appointed manager of its Glasgow branch, in which capacity he was still actively serving until he became ill just before last Christmas. Mr. Steele took an active interest in the Scottish Lighting Service Bureau and the E.L.M.A. Advisory Committee for Scotland.

The late Mr. A. Steele

Sir John A. Aiton.—The death occurred on 24th January, at the age of eighty-five, of Sir John Arthur Aiton, a director of Aiton & Co., Ltd.

WILLS

Sir Herbert A. Walker, K.C.B., general manager of the Southern Railway, 1923-37, chairman of W. B. Dick & Co., Ltd., and W. B. Dick & Co. (Holdings), Ltd., and Varley Dry Accumulator, Ltd., who died on 29th September last, left £38,059 gross (£7,854 net).

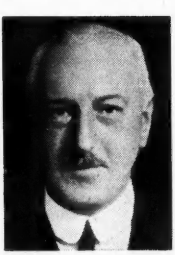
Mr. T. W. Morgan, M.B.E., works manager of Marconi's Wireless Telegraph Co., Ltd., who died on 2nd October last, left £4,170 gross (£4,030 net).

Mr. W. A. Woodeson, chairman and managing director of Clarke, Chapman & Co., Ltd., who died on 30th September last, left £69,936 gross (£62,846 net).

Colonel Sir Thomas Purves

HIS many friends in the electrical industry will learn with regret of the death of Col. Sir Thomas Fortune Purves, O.B.E., which occurred on 29th January in London in his seventy-ninth year.

Sir Thomas entered the Telegraph Department of the Post Office at Edinburgh in 1889, where he studied science at the University and at the Heriot Watt College. He won the first medal of the College for proficiency in electricity and technical telegraphy with the result that in 1892 he was transferred to the Engineering Department of the Post Office where he made rapid progress. In the 1914-18 war he took up a commission in the Royal Engineers as liaison officer between the Army Signals and the Post Office and he devised many special adaptations of telegraph and telephone apparatus. At the end of hostilities he was awarded the O.B.E. (Military Division) and the rank of honorary colonel of the 44th (London Home Counties) Division of the Royal Corps of Signals.



The late Col. Sir Thomas Purves

In 1919 he became assistant engineer-in-chief of the Post Office, and three years later succeeded Sir William Noble as engineer-in-chief. He was responsible for the adoption of the "Strowger" automatic telephone system, one of the most important decisions ever taken by the Post Office, and he attended all the conferences of the C.C.I. (Comité Consultatif International des Communications Téléphoniques à Grande Distance). Sir Thomas received his knighthood in 1929 and in the same year was elected President of the Institution of Electrical Engineers, of which Institution he first became an associate in 1902. He was awarded the Institution's Fahie Premium in 1925 for his paper on "The Post Office and Automatic Telephones." He served on the I.E.E. Council from 1923 to 1925, and in 1948 the Institution further recognized his work in electrical engineering and his services to the Institution by electing him an honorary member.

Other positions held by Sir Thomas were Assessor to the Advisory Council of the Department of Scientific and Industrial Research (1920-32) and member of the General Board and of the High Tension Committee of the National Physical Laboratory (1929-1937).

Sir Thomas retired from the Post Office in 1933, and then became managing director of United Telephones, Ltd. On the retirement of Llewelyn B. Atkinson, he became director of the Cable Makers' Association. He retired from that position in 1948.

H.V. Surge Divertors

Their Design and Performance

IN a paper which was read before the Supply Section of the Institution of Electrical Engineers in London last week, Mr. H. F. Jones and Mr. C. J. O. Garrard (both of the General Electric Co., Ltd.) spoke of the design, specification and performance of high-voltage surge divertors for power system protection. They began by describing those characteristics of lightning surges and system insulation and the electrical characteristics of systems which influence the design of surge divertors consisting of spark gaps and non-linear resistors. The authors then outlined the design features of representative divertors of this type and put forward proposals for a British standard. Consideration was then given to methods of making and evaluating tests upon surge divertors, details of the test circuits and test equipment being provided. The authors concluded by dealing with the installation and maintenance of surge divertors and referring to the design and use of surge counters as an aid to determining the effectiveness of surge divertor protection.

DISCUSSION

Opening the discussion, Mr. F. R. Perry (Metropolitan-Vickers) suggested four main reasons for the delay in surge-divertor development in this country. The lightning problem here was not so severe as in some countries, and this resulted in a general scepticism about the value of surge divertors. Some designs were probably marketed prematurely and their behaviour in the field was not altogether satisfactory. There was nothing to indicate whether a surge divertor was doing its job and some form of surge counter would afford proof that there were surges on the system with which the divertor was dealing.

Dr. J. S. Forrest (B.E.A. Research Laboratories) said the work described was a good example of co-operation between the manufacturing and supply industries. The authors' scheme for protecting machines where severe storms were prevalent involved putting divertors 2,500ft from the station, with others at 500ft away. There were also overhead earth wires, condensers at the machine terminals with another set of divertors across them, series inductors at the machine terminals, and a divertor at the neutral point. This presupposed a high degree of reliability for the divertors. It would be a good thing if large numbers of surge counters could be installed, particularly in lower voltage installations, but as their cost represented an appreciable fraction of the cost of the arrestors, an inexpensive counter was desirable.

Standardization Welcomed

Mr. R. Mallet (Midlands Electricity Board) thought the manufacturers' tests and specifications most confusing and that all concerned with the installation of surge divertors would welcome the standards suggested by the authors, which corresponded closely to American proposals. If the reduction of arrestor cost also reduced the reliability or efficiency of the arrestor, it would not pay in the long run. However cheaply surge divertors were made, in this country there would be no justification for installing them on transformers in rural districts.

Mr. W. Hill (Midlands Electricity Board) emphasized that the arc suppression coil was not an answer to lightning troubles because it could deal with only one phase at a time. The rural divertor could be justified if it were cheap, but they could not afford to put in divertors at every transformer.

Mr. R. Langlois-Berthelot (Electricité de France), in reviewing the position in France, mentioned that the price of arrestors still varied by as much as 40 per cent between manufacturers in the same country, and the difference was even greater between manufacturers in different countries. One reason for this was that different semi-conducting mate-

rials were used, each manufacturer claiming to have his own secret. There were also differences between standards and test rules. On the question of how many discharge currents there should be for each voltage he said that the manufacturer wanted a small variety of types, to reduce the price and permit manufacture in large batches.

Mr. K. Dannenberg (E.M.P. Electric) agreed with the need for a British standard for surge divertors. The application of surge divertors up to 33 kV was important, but the frequency of direct strokes to these lines was small, and indirect surges would have a wave shape with a much longer tail than 20μ sec. He would like to see a test with a second current wave based on a 10/50μ sec wave shape as opposed to the authors' figure of 10/20μ sec.

Reduction in Transformer Cost

Mr. J. S. Cliff (G.E.C.) said the authors confined their economic justification of surge divertors to the saving due to damage reduction, but this claim could be only substantiated in England for systems of 66 kV and under. An important factor in favour of the surge divertor for 132 kV and over, however, was the possible reduction in transformer cost. The higher the voltage and the larger the rating of the transformer the greater the saving. On large transformers the saving might be 20-25 per cent, compared with the additional divertor cost of 2-3 per cent.

Mr. A. J. Haselfoot (A.S.E.A. Electric) pointed out that surge divertors and arc suppression coils were not alternatives. The function of the suppression coil was to prevent line outages due to single-phase flashovers, while the surge divertor had to protect the station from the effect of voltage surges of sufficient magnitude to damage it.

Mr. T. F. Monahan (Metropolitan-Vickers) remarked that American manufacturers were often regarded as being ahead of the British with regard to surge divertors, but the paper indicated otherwise, because it allowed for a follow current which was larger than the usual practice. He wondered how the difficulties which this introduced in the design of gaps had been overcome.

Dr. R. H. Golde (E.R.A.) supported the authors' plea for specifications for lightning arrestors, but suggested that it was first necessary to consider the sort of stress to which they might be subjected.

Mr. H. L. F. Linton (Ministry of Fuel and Power) said that the trend in rural districts was towards unearthed wood pole construction, where flashover could hardly occur across line insulators and one would expect damage to unprotected transformers. In practice, however, the number of transformers damaged in this country on rural systems was very small; in 1949 only three were damaged.

Dr. F. J. Miranda said the authors preferred the term "surge divertor" to the more commonly used "lightning arrestor." Such a change would be justifiable if the former name better described the function of the apparatus, but that was not the case, and the fact that production in this country was mainly for overseas markets was a further reason for retaining the established term. In dealing with the economics of protection, the authors did not mention continuity of service, but loss of production due to service interruptions was a factor which a nationalized industry should consider.

The Foreman and Production

OVER 2,000 foremen and supervisors from 600 companies in the Birmingham district attended a meeting organized by the Institute of Industrial Supervisors held recently at the Town Hall, Birmingham, at which the part that the foreman can play in increasing productivity was discussed.

The meeting was presided over by Mr. J. Wilson, Principal of Birmingham Central Technical College, and the speakers included Sir Percy Mills, president of the Institute, who questioned whether the present period was the right time to reduce the hours allocated to production necessary to restore our resources. The Lord Mayor said that a new set of conditions had arisen which demanded the building-up of a new technique. The foreman had to play one of the most important parts in a new attitude of mind towards workers under him in order to achieve the desired results.

Other speakers were Sir Peter Bennett, Sir Anthony Bowlby and Mr. A. H. Squires. Visitors included representatives from the Institutions of Production Engineers, Works Managers, and Personnel Managers, and the Institute of Cost and Works Accountants.

Commerce and Industry

Television Transmitters Order

Lighting Fittings Exhibition

IT is announced by the British Broadcasting Corporation that it has ordered from Electric & Musical Industries, Ltd., two 30 kW vision transmitters for the projected stations in Scotland and the Bristol Channel area. The associated 12 kW sound transmitters have been ordered from Standard Telephones & Cables, Ltd.

Colonial Appointments

To assist those resident outside the Colonies who wish to have information about appointments in the Colonial Service, the Colonial Office has issued a booklet entitled "Appointments in His Majesty's Colonial Service" (H.M. Stationery Office, 1s net), in which particulars of standard of academic, professional or technical qualifications required for the various posts are given, together with salaries offered and general conditions of service.

The Seattle Contract

Last week it was announced that the Seattle (Washington) Electric Light Co. had placed its order for transformers and switchgear with the American General Electric Co., although the price was considerably higher than those quoted by Ferranti, Ltd., and English Electric Co., Ltd.

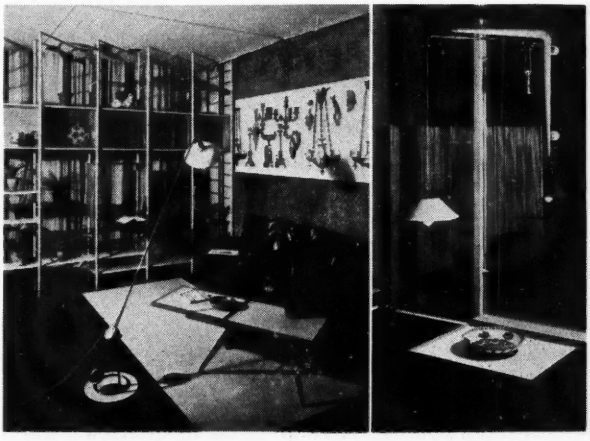
British Government representatives in Washington, D.C., protested against what they considered to be discrimination against British manufacturers. At his weekly Press conference on 25th January, Mr. Dean Acheson, United States Secretary of State, declined to make any comment on the matter.

The Dollar Export Board stated that the equipment offered by the British companies could have met all the operational requirements of the Electric Light Co. A report from Washington credits a Ferranti spokesman with saying that although the company was deeply disappointed at the decision it proposed to go ahead in an endeavour to secure orders from other American power companies.

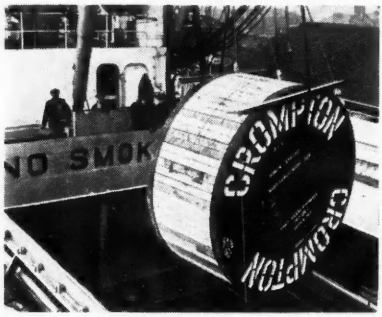
Continental Lighting Fittings

Post-war designs in domestic lighting fittings from Italy, Sweden and Denmark, with a small selection of British products, are now being exhibited by the Scottish Committee of the Council of Industrial Design in the showrooms of Wylie & Lochhead, Ltd., Glasgow. The aim of the exhibition is to give new ideas to manufacturers of lighting fittings in Britain, to suggest new fields of development for interested Scottish firms and to show the general public some of the best lighting fittings from the Continent.

Perhaps the most original collection comes from Italy. Standard lamps in particular show a concentration on adjustability. One is a standard that pivots in the middle while the shade and lamp are on an independent pivot allowing them to be swung in any direction. Another is a



Two examples of Italian lighting fittings being shown at the Glasgow exhibition



Crompton Parkinson cable being loaded on board ship for Brisbane City Council

"swinging jib" in walnut. It swivels from two walnut discs on a wall and from the end of the jib hangs the shade, which is moved by a brass counterweight. These are shown in the accompanying pictures.

Most of the Swedish fittings have mahogany or brass stems with a simple clean line. Some have hand-painted shades; there are two parchment shades with grasses and wild flowers pressed between the laminations, and there are a number with pleasing ceramic bases. The well-known Klint paper shades figure prominently in the Danish section.

Among the British exhibits the most experimental are the "balancer" fittings designed by Robert & Roger Nicholson, London, who are designers for the exhibition. Two table lamps in brass with copper shades cling to a table edge on small rubber feet, and there is a simple standard lamp of the same material. Troughton & Young, Ltd., show some "Versalite" fittings, and Merchant Adventurers, London, have several office wall fittings in aluminium. The exhibition closes on 14th February.

Engineering Equipment Users' Association

Five companies in the process industry field have formed an Association called the Engineering Equipment Users' Association. They are the Anglo-Iranian Oil Co., Ltd., Courtaulds, Ltd., Imperial Chemical Industries, Ltd., Lever Bros. & Unilever, Ltd., and Shell Petroleum Co., Ltd. This organization will provide its members with a means for exchanging information on standardization of engineering materials and equipment which they use in common. The new Association will work through the British Standards Institution on matters of general standardization and will assist that Institution by presenting, as far as possible, the co-ordinated views of its members' representatives who serve on B.S.I. Technical Committees, etc. When experience has been gained, it is hoped that arrangements can be made for other user firms, who may be interested, to take part in consultations of this kind. Brigadier L. F. S. Dawes, late Royal Engineers, has been appointed secretary, and the offices are at 20, Grosvenor Gardens, London, S.W.1.

Brisbane River-crossing Cable

During the past year more than a third of the paper insulated mains cable manufactured at the Derby Works of Crompton Parkinson, Ltd., has been exported. One of the last orders completed in 9149—1,000yd of 0.25 sq in 3-core 11 kV "H"-type submarine cable—was recently shipped to Brisbane on the *South Africa Star*. Designed with a special finish for under-river installation by the Brisbane City Council, the cable has protective coverings invulnerable to corrosion or attacks by termites. Two layers of galvanized steel armour wire, waterproof compounds and tapes, impregnated hessian tapes, and a brass tape, are applied over the 2.2in lead-covered cable, making it 3.5in overall. To meet the requirements of installation it was manufactured in two 500yd lengths each weighing 12 tons, so that extra large drums were needed. These are made of 6in timber, are 10ft in diameter, 5ft wide, and weigh 2 ton 15 cwt.

Cooker Display Stand

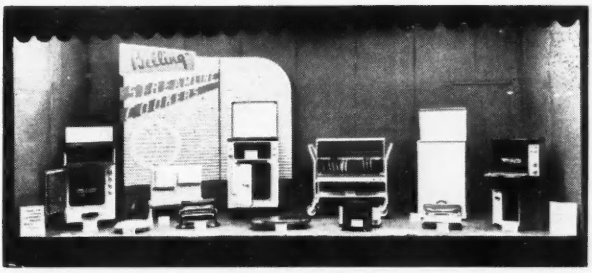
Two new cooker display stands have been designed by Falco Electrical Appliances, Ltd., which the company is offering to electricity undertakings for showroom window displays. One is designed for the company's Model 16 cooker, and the other, shown

A new Falco Junior cooker display stand

at the bottom of page 212, is for the Falco junior cooker.

Cooker Window Display

A number of cooking demonstrations have been carried out recently by Belling & Co., Ltd., in various districts of the Electricity Boards and in some cases special window displays were arranged to run concurrently with these demonstrations. In the accompanying picture we show the display arranged in showroom window at the Headrow, Leeds, of the No. 4 Sub-Area of the Yorkshire Electricity Board.



The Belling cooker display recently arranged in the Leeds Showroom of No. 4 Sub-Area of Yorkshire Electricity Board

Prospects in Hungary

Under the Hungarian Five-Year Plan, on which a start is being made this month, total industrial production is due to rise to 96.4 per cent above the 1949 level. Electrical energy produced will be increased from 2,200 million kWh in 1949 to 4,270 million kWh in 1954. This will be achieved by the construction of three thermal, one natural gas and one water-power plant, and by enlarging existing stations.

Stewarts and Lloyds

From the beginning of this year all the mineral properties of Stewarts & Lloyds, Ltd., the Stanton Ironworks, Co., Ltd., and other subsidiary companies, and land associated therewith, were transferred to Stewarts & Lloyds Minerals, Ltd., and will in future be owned and operated by this company. The directors of the company are Messrs. J. R. Menzies-Wilson (chairman), R. B. Beilby and A. F. Holden, and the secretary is Mr. J. McLaren. The administrative office of the company is at Brigstock, near Kettering, Northants.

Refrigerator Sealed System

We are informed that from 1st February, members of the British Refrigeration Association have extended the guarantee on the sealed system to five years.

New B.B.C. Station

During the week beginning 22nd January the third programme transmitter at Dryden Road, Liverpool, which was installed in 1940, was closed down and the service transferred to the B.B.C.'s new station in Mersey Road, Birkenhead, on a 2-acre site and of 1 kW housed in a temporary building and feeding into a T-aerial supported by two tubular steel masts, 126ft high. Ultimately, when the permanent building has been completed, the station will have two 1 kW transmitters, one for service and one in reserve, controlled over telephone lines from Broadcasting House, Manchester.

"Electricar" Trucks

As from 1st February the sales of "Electricar" industrial trucks, formerly marketed by Crompton Parkinson, Ltd., became the responsibility of I.T.D., Ltd., "Stacatruc House," 142, Sloane Street, London, S.W.1, now a subsidiary of Austin Crompton Parkinson Electric Vehicles, Ltd. Spares and service for "Electricars" and "Stacatrucs" will now be dealt with by Austin Crompton Parkinson Electric Vehicles, Ltd. (Service Department), Webb Lane, Hall Green, Birmingham, 28, telephone: Springfield 3301.

Alternators for Peru and Australia

Recent orders received by Associated British Oil Engines, Ltd., from overseas include Mirrlees-Brush alternator sets for Peru and Australia. Three sets incorporating Mirrlees "HF7" engines directly coupled to 450 kW, 0.8 p.f., 270 V, 60 c/s Brush alternators have been ordered through G. Berckemeyer and Co., of Lima, Peru, for the rayon factory of Rayon Peruana. The switchgear for controlling the sets for parallel operation is also being supplied by Brush.

Through British Oil Engines (Australasia), Pty., Ltd., Sydney, an order worth over £20,000 has been received for six sets incorporating Mirrlees "HFS8" engines for continuous running directly coupled to Brush 830 kW, 0.8 p.f., 6,600 V, 50 c/s alternators. These sets are for the State

Electricity Commission, Victoria, and are a repeat of the order given by the Commission in September, 1949.

Trade Announcements

Oak Instruments has removed to 175, Uxbridge Road, Hanwell, London, W.7, and is now trading under the name of Hatfield Instruments.

The address of the Chester Branch office of **British Insulated Callender's Cables, Ltd.,** is now 1, Stanley Street, Watergate Street, Chester. The Cambridge office has also been removed to 61a, Regent Street, Cambridge. The telephone numbers in both cases are unaltered.

We are informed that the sole concessionaires in Portugal for **Hugh J. Scott & Co. (Belfast), Ltd.,** are now H. Vaultier & Co., Siege Social, Colcode Marques De Abramites, 43-45, Lisbon, Portugal.

Morphy-Richards, Ltd., announce that they are now able to offer hire purchase facilities for their new vacuum cleaners. Agreement forms can be obtained from dealers' usual electrical wholesalers.

Mr. J. V. M. Haydock has joined **Omega Lampworks, Ltd.,** as representative in the counties of Nottingham, Derby and Lincoln. He was previously with Thorn Electrical Industries, Ltd.

Berry's New York Showrooms

We learn from Berry's Electric, Ltd., that they have opened new showrooms at 225, Fifth Avenue, New York, N.Y. These are devoted to "Magicoal" fires and radiators, including a special range designed for the United States, and certain types of period lighting fittings. The showrooms are under the supervision of the company's sole American agent, S. P. Skinner Co., Inc.

Broadcasting Transmitter for Denmark

The Danish Posts & Telegraphs Department has ordered two of the new range of broadcasting transmitters designed and manufactured by Marconi's Wireless Telegraph Co., Ltd. They are both medium wave transmitters, each air cooled and with an output power of 100 kW, and are to be installed at Skive and Kalundborg.

Hospital Radio System

A hospital sound reproducing system developed by Philips Electrical, Ltd., enables loudspeakers, headphones or the latest "Pillotone" under-pillow speakers to be interchanged at any point in a single 25 V line from the control amplifier. This means that on the occasion of a special broadcast a loudspeaker may be plugged into any bedside point so as to cover the whole ward. The system is so designed that whatever number and combination of listening units are connected across the line, each unit receives the correct amount of current for optimum performance. Not only is the system more flexible than previous ones, but it simplifies and reduces the cost of hospital sound reproducing installations.

Works Visit

On 23rd January, Mr. S. Moolgaokar, a director of the Tata organization with whom E. K. Cole, Ltd., are associated in the manufacture and distribution of radio products in India under the name of National Ekco, paid a visit to the Ekco Southend factory. Mr. Moolgaokar was met by Mr. E. K. Cole, chairman and managing director, and Mr. N. C. Robertson, M.B.E., deputy managing director. Also present was Sir Frederick James, O.B.E., who is managing director of the English Tata company. After lunch Mr. Moolgaokar toured the offices and factory with Mr. Robertson.

Catalogues and Lists

Chamberlain Industries, Ltd., Staffa Work, Staffa Road, London, E.10.—Bi-monthly publication entitled "Plant," which contains an up-to-date list of plant for sale or hire.

Renold & Coventry Chain Co., Ltd., Renold Works, Didsbury, Manchester.—Catalogue of stock chain drives of up to 140 h.p.

British Driver Harris Co., Ltd., Gaythorn Mill, Albion Street, Manchester, 15.—Technical brochure containing data and specifications of electrical resistance alloys.

Ferranti, Ltd., Hollinwood, Lancs.—An illustrated folder of Ferranti clocks, including a list of reduced prices.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered within a month of 25th January:—

BRILLON. No. 681,340. Class 9. Electric cables, electric insulated wire and fuse wire.—British Valve & Electrical Accessories Mfg. Co., Ltd., 19-25, Cropley Street, London, N.1.

No. 680,726 (design). Class 9. Electrical apparatus and instruments included in Class 9; and scientific, photographic and cinematographic apparatus and instruments.—Instrument Reconditioning & Sales, Ltd., Euston Chambers, Euston Grove, Morecambe, Lancs.

Contractors' Dinner

Emphasis on Private Enterprise

OVER 500 members and guests were present at last Tuesday's annual dinner of the Electrical Contractors' Association and its allied organizations at the Savoy Hotel, London. The president, Mr. S. Dickinson, Associate I.E.E., took the chair.

Lord Mancroft, who was the principal guest, proposed "The Allied Associations and Honorary Officials." In the course of a witty speech he mentioned that he was chairman of the Joint Advisory Council of the Carpet Industry, which although apparently very dissimilar, had in common with the electrical contracting industry a pride in craftsmanship. Lord Mancroft said that there was no sin in making a profit; it should be distinguished from profiteering, such as that practised by the Post Office.

It was crass lunacy for a Government to exhort private enterprise to produce and export more and more and in the next breath heap upon it all the abuse in the world. But in defending itself private enterprise must be certain that none of the attack was justified; it must not be too self-righteous. He believed that shortcomings in British exports had been rectified and charges from America that our products were too expensive and badly packed, and that our salesmanship was inadequate, were untrue. The Americans were becoming frightened by the impression British exports were making on [illegible] market, and were developing a [illegible]nce of which the recent rejec[illegible]h tenders by Seattle was [illegible].

In his [illegible] toast, Mr. Dickinson [illegible]octrine that there was no room for politics in business was obsolete. Politics had been thrust upon business and the perpetuation of wartime controls was largely political. There was too much inclination to make decisions with an eye more on political effects than on the sound commercial principles of free enterprise. Politics had entered into the relationships between employers and operatives tending to destroy mutual trust and goodwill. If we were to compete in world markets we must increase production and lower costs, but this was hindered by the introduction of the shorter working week with excessive overtime at higher rates. Moreover, we were handicapped by constant unofficial strikes by which malcontents virtually controlled the country. It was imperative to find a solution to this industrial instability. The greatest contribution to recovery would be the restoration of a sense of mutual confidence among all classes and revive the spiritual qualities of the will to work and pride in craftsmanship.

Reverting to the Association's own activities, Mr. Dickinson said that the nationalized electricity authority was a formidable opponent in the field of electrical contracting and retailing. The B.E.A. had wide powers but they, too, were not without their resources. They were prepared to meet fair competition and stood by the statement of agreed principles between the B.E.A. and the Association. The public would determine whether the cause of individual enterprise would survive, and they were confident as to its verdict.

The health of the guests was proposed by Mr. P. G. Wallis, Associate I.E.E., in a felicitous speech in the course of which he regretted the absence on account of ill-health of Mr. H. F. Carpenter, secretary of the B.E.A., and welcomed Dame Caroline Haslett, who was a member of that body.

Responses to the toast were made by Mr. A. W. Kenyon, C.B.E. (vice-president of the Royal Institute of British Architects), who said that he had served for a time as a working electrician; and by Mr. W. H. Williams (chairman of the Electric Lamp Manufacturers' Association), who hoped that the manufacturers and contractors would continue to work together in the public interest.

The toast of "The Chairman" was proposed by Mr. J. R. Halliwell and Mr. Dickinson replied.

AREA BOARDS' REPORTS

Review of the First Year's Activities

CONTINUING the summaries of the 1948-49 annual reports of the Area Electricity Boards, we give below brief details of five others, with an analysis of kWh sales and revenue:—

EAST MIDLANDS

Surplus furnace gas at the Renishaw Iron Co.'s works was used to generate 5.7 million kWh, and this was supplied to the Board at an average price of 0.351d per kWh. The 1,000 kW turbo-alternator commissioned in May, 1948, at the company's works, has now been added to by a second set. Negotiations have also taken place with another concern in North Derbyshire with a view to waste heat generation.

During the year 64 new special agreements were completed for industrial supplies aggregating 11,500 kVA. For such new agreements, and for others on renewal, a standard coal clause has been introduced. Uniformity has also been achieved in the matter of service charges, the standard rate now being 7s 6d per yard for underground cable (after the first 20 yards) and 4s per yard for overhead line (after the first 50 yards). Public lighting is another sphere in which inequalities are being smoothed out. Particular interest has been shown in the Board's offer, in certain conditions, to provide equipment without charge and quote an "all in" rate. A standard scheme of credit sales for domestic apparatus has superseded all existing hire-purchase and deferred payment systems. In view of the public demand for simple hire (there are some 212,655 appliances on hire in the Area), consideration is being given to a scheme for hiring out standard types of cooker.

In the rural areas, two major schemes, covering altogether 39 villages and hamlets, have been approved; the potential consumers average only 14 per village. With 808 farms connected during the year, the total is now 11,360. Special attention is being given to the problem of economically supplying the farms and smallholdings placed thinly along the roads in the Fens.

On contracting, it is stated that the Board's present policy is to continue the installation departments but not to extend them unless there is an undoubted need.

A limited change-over programme was completed, resulting in a net decrease of 2,723 d.c. services; 70 per cent of the remaining 74,351 are in Nottingham. In addition, there are 199,699 services at non-standard voltage in the Area, including 13,000 in the Chesterfield District, where a 30 c/s supply is taken by the Board from adjoining collieries. The total number of consumers in the Area increased by 42,254 to 934,594.

MIDLANDS

The policy of the Midlands Board in regard to sales and contracting is clearly defined in its annual report and contrasts in some respects with that adopted in the East

TABLE I
Area Boards' Financial Results

Board	Trading Revenue*			Other† Income	Interest, etc., Charges‡	Net Revenue	Transfers to Central and Area Reserves	Balance Carried Forward
	Sale of Electricity	Meter and App. Rentals	Surplus on Contracting and Sales of Fittings					
	£	£	£	£	£	£	£	£
East Midlands	13,927,931	275,971	55,774	101,995	752,546	748,048	651,000	97,048
Midlands	18,106,299	255,860	110,269	93,752	766,224	628,241	445,000	183,241
South Wales	8,651,177	159,614	10,801	11,925	296,363	317,925	242,000	75,925
Merseyside & N. Wales ...	11,208,796	233,476	6,454	38,551	406,011	140,686	120,000	20,686
Yorkshire	16,910,778	266,097	93,883	56,764	721,090	486,623	330,000	156,623

* Revenue from the "Clow Differential" surcharge is excluded, being credited to suspense account. † Rents received, other miscellaneous income and interest on hire-purchase and similar sales. ‡ Interest on consumers' deposits and B.E. charges in respect of interest and financing; no provision for income tax or profits tax was required.

Midlands. Sales of all types of electrical apparatus at the service centres have been vigorously pursued although, adds the report, "there is still a wide field in which this valuable service to consumers can be extended." In the belief that it is in the interests of consumers to own their appliances, the Board has decided not to extend any scheme for simple hire, and existing hire schemes are to be gradually eliminated. Instead, a credit sales scheme has been made available. The use of prepayment meters is also being discouraged.

At vesting date some undertakings were running very active contracting departments, and the Board is taking steps to extend the service to all parts of the Area so that it can carry out all kinds of work, from house wiring to the largest industrial installations.

During the year 1,185 farms were connected, and the total served at the end of the period was 9,063, a "saturation" of 34 per cent. The number of consumers of all classes rose by 42,735 to 980,456.

SOUTH WALES

The Area contains an important industrial zone between the Rivers Usk and Towy where 1.7 million out of the total population of 1.97 million are concentrated. The predominance of industry is reflected in electricity sales, 80 per cent of the Board's supplies being in this category. During the year 262 new industrial consumers commenced taking a supply, making 3,435.

The report states that electrification of coal mining plant has gathered momentum and is likely to be intensified. When completed, the new works of the Steel Company of Wales at Margam (hot rolled strip) and Trostre, Llanelly (tinplate) will become the Board's largest individual consumers. Negotiations were concluded for supplies to the works, at two points, of 52,000 kVA and 35,000 kVA, respectively.

In the rural parts 230 farms were connected and 80 schemes of rural supply approved to serve areas adjacent to existing distribution. Farms connected now number 2,604. Consumers of all classes totalled 436,227, an addition of 18,422.

In the field of public lighting a further 3,947 points were connected, making 46,057, the number of lighting authorities supplied having increased by six to 129.

Electrical installation activities are being expanded to ensure an adequate service throughout the Area. By operating in accordance with the code of practice agreed with the E.C.A. a fine but competitive basis of trading will be ensured.

MERSEYSIDE AND NORTH WALES

Almost nine-tenths of this Area can be classed as rural, including large tracts of difficult terrain, amounting to some 2,500 sq miles, which are without a supply. A survey of North Wales, South Cheshire and North Shropshire showed that there were 45,150 premises, including 25,348 farms, more than half-a-mile from a supply point, the cost of serving these at to-day's prices being of the order of £12,000,000. In addition, there were approximately 29,000 unconnected premises a shorter distance from a supply point.

Although parts are likely to be uneconomic, the Board approved in principle engineering proposals for the complete electrification of the area surveyed, and it was decided that the scheme should be divided into 193 sections, work on at least one section in each county to proceed simul-

TABLE II

Sales of Electricity in Million kWh and Price Received per kWh Sold

Board	Flat Rates				Two-Part Tariffs				Farming Tariffs		Large Power		Public Lighting		Traction		Total†	
	Lighting		Heating etc.*		Domestic		Commercial											
	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.	Mill. kWh	Price d.
(1)	122.3	3.92	145.7	1.12	903.8	1.01	95.3	1.57	11.9	1.19	1,616.2	0.98	14.2	1.23	29.9	0.94	2,939.3	1.14
(2)	169.1	3.62	351.8	1.16	1,012.4	0.98	83.3	1.55	9.8	1.34	2,260.0	0.89	16.4	1.35	55.9	0.99	4,058.7	1.07
(3)	66.0	4.03	154.9	1.16	238.0	1.11	30.2	1.73	4.6	1.50	1,738.1	0.73	9.8	2.29	10.0	0.78	2,251.6	0.92
(4)	107.7	3.89	149.6	1.08	605.5	1.04	109.6	1.49	0.03	1.10	1,395.0	0.86	13.5	1.42	103.8	0.99	2,484.7	1.08
(5)	122.8	3.14	255.3	1.01	1,025.7	1.07	108.2	1.77	7.3	1.39	2,449.8	0.80	21.9	1.31	133.9	0.94	4,124.9	0.98

* Including cooking, water heating and small power. † Excluding inter-Board sales.

taneously. An interim scale of capital contributions for single-phase connections was adopted ranging from £2 to £100, individual contributions being related to the size of house and acreage of farm. In the selected sections the occupiers of 3,000 premises (including 800 farms) out of 3,750 visited expressed a desire to take a supply.

Plans of the former authorities for engineering work of a capital nature were examined and modified where necessary to meet the altered circumstances. In the case of two 33kV schemes the total estimated cost was reduced from £667,000 to £143,000 and their extent and utility increased (one of the proposed systems would have been out of phase with adjoining systems). Altogether, the Board authorized further engineering works estimated to cost £1,891,938 and estimates for the ensuing three years amount to £2,963,000, £3,669,000 and £3,974,000 respectively.

Consumers at the end of March numbered 660,955, an increase of 27,748.

YORKSHIRE

A far-reaching plan to take a supply to all villages in the Area within five years (1949-54) was approved in principle by the Board, but may have to be curtailed in view of the restrictions on national capital expenditure. In the first year of the plan (1949-50) it was intended to construct about 170 miles of mains and other works at an estimated cost of £326,000, to provide a supply to 530 farms and 87 villages, with 2,622 other consumers. During the year ended 31st March, 1949, 16 further villages were served and 369 farms connected.

On the industrial side, additional supplies amounting to some 50,000 kW of installed load were afforded, and special terms were negotiated for 30,000 kW to be connected shortly. During the next five years the National Coal Board expects to increase its requirements in the Area by approximately 125,000 kW. Besides houses erected privately, 18,507 built by local authorities were connected in 1948-49. Altogether, the number of consumers increased by 34,663 to 1,118,868.

Charges for re-testing wiring installations have been standardized, as also have the scale of charges for service lines in excess of the free lengths, and hire-purchase terms. The extension of hire facilities for certain apparatus is being considered.

Among the larger engineering works dealt with, mention is made of a 33 kV scheme for Leeds, 33 kV supplies to steelworks at Scunthorpe, and supplies required for the British Railways Manchester-Sheffield electrification.

SECOND POWER CONVENTION

PROVISIONAL arrangements have been announced for the second British Electrical Power Convention to be held at Harrogate under the presidency of Sir Vincent de Ferranti, M.C., M.I.E.E., from 19th to 23rd June.

The Convention office will be at the Royal Hall and on the Monday morning the issue of badges and Convention matter will commence. In the afternoon the President will open the electrical exhibition at the Sun Pavilion and the Mayor and Mayoress of Harrogate will hold a reception at the Royal Hall in the evening.

On Tuesday, 20th June, after a civic welcome by the Mayor, Sir Vincent de Ferranti will deliver his presidential address and the afternoon session will be occupied by a paper by Sir Henry Self, K.C.B., K.C.M.G., K.B.E. The ladies will meet Lady de Ferranti at tea. There will be a reception by Sir Vincent and Lady de Ferranti at the Royal Hall in the evening. The local Rotary Club has issued an invitation to lunch to Rotarian delegates at The Lounge Hall, Parliament Street.

Wednesday's proceedings will open with a paper presented on behalf of the Electric Lamp Manufacturers' Association; coach tours are being arranged for the afternoon.

On the Thursday morning there will be a joint paper prepared by the British Electricity Authority, the British Electrical and Allied Manufacturers' Association and the Watertube Boilermakers' Association and the discussion on this will be continued in the afternoon. The customary luncheon of the Electrical Association for Women is to be held at The Lounge, Parliament Street. In the evening the annual dinner (limited to 400) will take place at the Majestic Hotel and there will also be a dance at the Royal Hall.

The Convention ends on the Friday morning (23rd June) with a general meeting of delegates.

Transport Bill Opposition

NEWCASTLE-ON-TYNE City Council is to oppose a Bill promoted by the Gateshead & District Tramways Co., which provides for the operation of motor buses instead of trams and repeals the powers granted to the company some years ago to introduce trolley-buses.

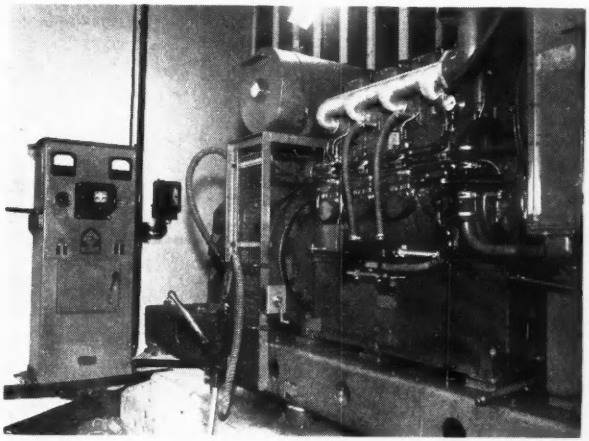
ELECTRICITY SUPPLY

Month's B.E.A. Contracts Total £1,800,000

System Reinforcement in Ayrshire

DURING the past month, contracts have been placed by the British Electricity Authority for power station, switching and transforming station and transmission equipment amounting in the aggregate to £1,807,294. The principal contracts include the following:—

Battersea "B" generating station: 3,300 V auxiliary switchgear (Ferguson Pailin, Ltd.). Barking station: Coal handling, storing and reclaiming plant (General Electric Co., Ltd.). Brunswick Wharf station: Foundations and civil engineering work for second half of station (Peter Line & Co., Ltd.). Littlebrook "C" station, Kent: Ash and dust handling plant (Babcock & Wilcox, Ltd.) and auxiliary switchgear and accessories (British Thomson-Houston Co., Ltd.). Keadby station, Yorkshire: Ash and dust handling plant (Babcock & Wilcox, Ltd.). Thornhill station, Dewsbury, Yorkshire: Main auxiliary and multicore cables and accessories (British Insulated Callender's Cables, Ltd.). Rugby substation: 132 kV 2,500 MVA switchgear (British Thomson-Houston Co., Ltd.). Slough substation: 132 kV 2,500 MVA switchgear (A. Reyrolle & Co., Ltd.).



The McLaren-Brush diesel standby generating set installed in the St. Paul's control centre of the British Electricity Authority

B.E.A. Control Centre

At the St. Paul's control centre of the B.E.A. there are alternative supplies for operating the equipment, but if for some reason both of these fail there is only an emergency 25 c/s supply from the London Transport railway system. As this can be used for lighting purposes only, a 1,000 r.p.m. 55 kW 400/440 V 50 c/s McLaren-Brush diesel generating set has been installed to ensure that under no circumstances will the control centre be immobilized through lack of supply.

The set is of conventional design and is of the type of which large numbers were produced during the fuel crisis three years ago. A novel feature, however, is the incorporation of a thermostatically controlled immersion heater in the engine water cooling system. This was supplied by Caldwell Heaters, Ltd., and maintains the engine at a constant temperature so that it will start easily irrespective of weather conditions. The engine is push-button started either locally or from a point below ground just outside the national grid control room. Two 24 V batteries (one a stand-by) are provided for this purpose, the one in use being charged at 1 A by Westinghouse equipment and the other at 5 A by an Ediswan unit.

Estate Supply Controversy

Middlesbrough Town Council has been informed that the Association of Municipal Corporations has been unable to reach any finality in their discussions with the

British Electricity Authority on the general question of terms and conditions to be adopted for the provision of electricity supplies to new housing estates. The Town Council has had considerable correspondence with the North Eastern Electricity Board regarding the supply of electricity to the new estate at Beechwood, but the Board has refused to consider the erection of a substation unless the Council agrees to lease a site at a nominal rent of 1s per annum. Owing to the fact that the houses are already being built the Council has decided under protest, to accept the Board's terms.

Ayrshire Reinforcement

The South West Scotland Electricity Board has prepared a scheme for the reinforcement of the supply system in Ayrshire. The scheme, which is estimated to cost £1,200,000 and to take three years to complete, has been reviewed from a financial viewpoint in consequence of the cuts in capital expenditure announced by the Government, but in view of its essential character the necessary approval has been received from the B.E.A.

At present electricity is supplied to Ayrshire from points at Kilmarnock and Saltcoats but it has been decided to limit the area in Central Ayrshire supplied from Kilmarnock and to provide a new substation near Coylton to the east of Ayr to serve the southern part of the County. This plan has the added advantage of being capable of easy extension to meet the demands of the National Coal Board in South Ayrshire as new coal-fields are developed.

Altrincham Road Lighting

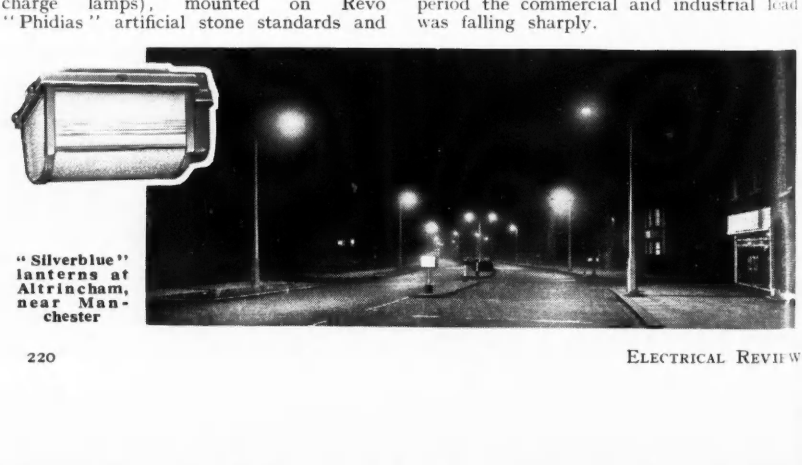
Revo "Silverblue" lighting fittings are used in a new lighting installation at Altrincham, planned under the direction of the borough surveyor. It comprises 69 lanterns (with 400 W mercury vapour discharge lamps), mounted on Revo "Phidias" artificial stone standards and brackets. The units are spaced at intervals of 40 yards along each carriageway. Erection and installation was carried out by Revo Street Lighting Department. The "Silverblue" lantern has a special system of light control by reflectors and refractors. The bodywork consists of two single-piece die-castings of aluminium alloy forming the main upper canopy and a glazed lower portion. The glazing consists of two refractor panels with smooth cover glasses and figured glass for the remainder. Each refractor panel has a plain upper section and a prismatic lower section. There are two specular reflectors of polished stainless steel on each side of the lamp—an upper reflector which redirects light through the plain upper section of one of the glass panels and an auxiliary lower reflector which directs light through the prismatic section. The prisms also control the directly incident light from the source.

Factory Plant's Record Output

A record of 1,015,700 kWh was generated at the Ford Works power house at Dagenham on 26th January. Power surplus to the requirements of the factory is passed to the national grid, and that day the Ford contribution amounted to 311,700 kWh.

Lighting Concession

In accordance with the undertaking given last autumn, the Minister of Fuel and Power has reviewed the restrictions on shop window and advertisement lighting, and on Tuesday it was announced that, as from 1st February, such lighting would be permitted from 5.30 p.m. instead of from 7 p.m. The British Electricity Authority had informed the Minister that since the beginning of December the plant capacity available had increased by some 400 MW as a result of new commissioning and reduction in plant under repair. Apart from this, in February the lighting load grew very slowly between 5.15 p.m. and 5.45 p.m., between which period the commercial and industrial load was falling sharply.



"Silverblue" lanterns at Altrincham, near Manchester

FINANCIAL SECTION

Company Notes and Stock Exchange Activities

REPORTS AND DIVIDENDS

Radio Rentals, Ltd., held its annual meeting on 30th January when Mr. H. F. Hunt (chairman), who presided, in the course of his speech said that the most important development during the year under review was in respect of television, and they had formed a new subsidiary company, Vidio Rentals, Ltd., for this purpose. They had now several thousand sets on rental and the demand continued to be heavy. There had also been a major development in the radio field, and they were now operating in Glasgow, Belfast and Newcastle. For their Scottish business they had acquired a separate company which they had renamed Radio Rentals (Scotland), Ltd. Their subsidiary, Mains Radio Gramophones, Ltd., had operated to full capacity and the two Rentertainments companies had operated profitably. Burgot Rentals, Ltd., the subsidiary operating an automatic burglar alarm, had not yet reached the profit-earning stage in its development, but there was an increase in the number of subscribers and progress in its relations with the police departments and insurance companies concerned with burglary protection.

The English Electric Co., Ltd.—The offer for sale by Lazard Brothers & Co., of £5,000,000 4 per cent debenture stock was heavily oversubscribed, the total amount applied for being in excess of £30 millions.

Bylock Electric, Ltd., reports a trading profit for the year to 21st July last of £14,986, after providing for depreciation, but before tax, as compared with a loss of £12,162 for the previous year. Tax absorbs £7,276. No ordinary dividend is recommended. No payment was made for the previous year, as compared with 300 per cent for 1946-47.

Electrical & Industrial Investment Co., Ltd., reports a revenue for 1949 of £85,944, as compared with £80,622 for 1948, and a net balance, subject to audit, of £39,153 (against £36,430). The deferred ordinary dividend for the year is maintained at 20 per cent, and £21,003 is transferred to undivided profits account (against £18,280).

R. A. Lister & Co., Ltd., report a group profit for the year ended 30th September last of £299,122, as compared with £240,754 for the preceding year. The net profit of the parent company was £197,975 (against £232,370). It is proposed to pay a final dividend of 6½ per cent on ordinary capital of £2,600,000. Last August 100,000 new £1 ordinary were offered to holders at 65s. each and at the same time there was also a capital bonus of 100 per cent. An interim dividend of 5 per cent was paid on the old capital in July last. The final dividend a year ago was 5 per cent with a bonus of 8 per cent on £1,200,000.

NEW COMPANIES

H. J. Boulting (Electrical Supplies), Ltd.—Registered 10th December. Capital £1,000. Directors: H. J. Boulting and J. C. Brown. Regd. office: Harold Street Works Aylestone Park, Leicester.

Motivators, Ltd.—Registered 30th December. Capital £100. Designers, manufacturers, builders and letters on hire of power units, engines, motors, turbines, etc. J. S. Neale is permanent director. Regd. office: 15, Tenterden Avenue, Hendon, N.W.4.

S. C. Franklin, Ltd.—Registered 10th January. Capital £1,000. Manufacturers of and dealers in wireless and television sets and accessories, electrical appliances, etc. Directors: S. C. Franklin and Mrs. Edith A. Franklin. Regd. office: 31, Appledore Road, Tenterden, Kent.

LIQUIDATIONS

Cosmo Electrical Trading Co., Ltd.—Meeting 28th February at 2-5, Old Bond Street, London, W.1., to receive an account of the winding-up by the liquidator, Mr. C. N. Baker.

C. & D. Electric (Appliances), Ltd.—Meeting 10th March at 47, Mosley Street, Manchester, to receive an account of the winding-up by the liquidator, Mr. A. T. Eaves.

BANKRUPTCIES

Ellen Morris, lately carrying on business at 120, Park Road, Aston, Birmingham, under the style of F. Austin & Co., retailer of radio and electrical goods.—Receiving order made 17th January on a creditor's petition.

First meeting 7th February at 37, Temple Street, Birmingham, 2. Public examination 16th March at the Court House, Corporation Street, Birmingham.

FINANCIAL SECTION

STOCKS and SHARES

STOCK Exchange markets, for the time being, are mainly political. Party manifesto follows party manifesto, and each has a transient influence over prices. From the directly material point of view, it cannot be said that business shows any particular sign of release from the restraint imposed by the political outlook. Comparing prices of to-day with those of a month ago, the majority of changes have been downward, but, in most cases, the falls are of little significance. They are, in fact, no more than might have been expected in view of the uncertainty provoked by the imminence of a General Election.

English Electric's Success

Dealings started last Monday at a premium of 2 per cent in the £3 million 4 per cent debenture stock issued by the English Electric Company the previous week at 99. Resounding success attended the issue. Despite the investment uncertainties of the immediate future, but assisted by a firm gilt-edged market, the offer attracted applications to the tune of something over £30 million—ten times the amount available. Previously, the market had opened in the company's new £1 ordinary shares, offered to existing holders at 35s in the ratio of one new for six shares held. These new shares are quoted at 6s 6d premium. The old shares recovered part of the value of the "rights" deducted from the price, and at 41s 6d yield £4 16s 5d per cent on the 10 per cent dividend expected shortly.

Electric Cable Shares

Some of the older investment favourites among electric cable shares remain as highly valued as any in the industrial markets. Thus, B.I.C. are on a yield basis of 4¼ per cent, and Henleys at 22s pay £4 11s per cent. Among the better yielders is a line of Scottish Cable 4s ordinary shares, currently on offer at 23s. The return works out at about 5¼ per cent on the 30 per cent paid for the past two financial years, ending in April. Profits have been rising and the last group figures represented earnings of over 72 per cent on the £250,000 ordinary capital. On General Cable Manufacturing shares, now offered in the market at 17s 6d, there is an indicated yield of over 8½ per cent and an 8½ per cent return is given by Hackbridge Cable 5s ordinary, at 11s 9d, on the basis of the last payment. Reliance-Clifton Cables 5s shares can be bought at a little under 20s, at which they yield 6¼ per cent on the money.

Gilt-edged and Industrials

Whatever their significance may be, movements in Government security prices since mid-January have been not far from spectacular, by gilt-edged standards. The bellwether—2½ per cent Consols—gathered 3 points in not much more than a week, advancing to 71½, before reacting by the beginning of this week to 70⅞. British Transport "threes" did equally well, rising from 87 to 90 before falling to 89⅝. Both the British Electricity 3 per cents added more than 2 points, of which they lost a fraction, the senior issue being 95¼ and the longer-dated junior a point lower. Among industrials, outstanding strength in Turner & Newall shares followed closely upon the chairman's recently expressed views on dividend limitation. A modest rise in British Insulated Callender's ordinary was also linked, by some observers, with the very moderate rate of dividend in relation to earnings.

Seven Rises

Politics has played no part in the movement of Cable & Wireless ordinary stock, which, after its rise of 21 points between the end of November and the end of December, gained another 4½ at 255½ during the month just closed. The preference stock is also harder at par, and Globe Telegraph advanced 3s 9d to 43s 9d in sympathy with these rises. Most of the other fluctuations on the month range from 3d to 2s 6d. Oriental Telephones at 47s show a gain of 2s 6d, the buying being due, according to market report, to consideration of the assets held by the company. A rise of 3s 6d lifted Telephone Properties to 18s 6d. Last August, shares changed hands at 9s 3d; the appearance of a favourable annual report served to adjust the quotation. Switchgear & Cowans, with a rise of a florin to 15s, reflect demand from the provinces.

Election Portents

Prices of gilt-edged securities took a turn for the better after the middle of January. They advanced again, quite emphatically, after publication of the Conservative Party's election manifesto, but on second thoughts effected a partial withdrawal. In the industrial markets, there have been occasional sallies in favour of shares depressed by threats of nationalization: cement and industrial assurance shares are illustrative.

Electrical Investments

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price 31 Jan. 1950	Month's Rise or Fall	Yield £ s. d. p.c.
Overseas Electricity Companies					
Atlas Elec.... ...	2	2½	14/6	+9d.	3 9 0
Calcutta Elec. ...	6†	6†	22/6	−1/6	5 6 8
Cawnpore Elec. ...	13	10	40/-	—	5 0 0
East African Power	7	7	33/-	−9d.	4 4 0
Jerusalem Elec. ...	5	6	14/3	—	—
Madras Elec. ...	8	5	32/6	−⅛	3 1 6
Nigerian Elec. ...	12½	10	33/9	—	—
Palestine Elec. "A"	7†	Nil	28/6	—	—
Perak Hydro-Elec.	Nil	Nil	9/6	−6d.	—
Whitehall Inv. Pref.	—	6	23/-	—	5 4 4
Equipment and Manufacturing					
Aberdare Cables ...	10	15	55/-	+2/6	5 9 1
Aron Elec. Ord. ...	15	15	36/3	—	8 5 8
Assoc. Elec. Ord. ...	15	15	70/-	—	4 5 9
Automatic Tel & El.	12½	12½	53/3	−⅛	4 14 0
Babcock & Wilcox	15	15	58/6	−2/3	5 2 9
Baldwin, H. J. (2/-)	25	25	5/3	—	9 10 6
British Aluminium	10	10	40/-	−1/-	5 0 0
B.I. Callender's ...	6⅝	6⅝	31/6	−6d.	4 5 2
British Thermostat (5/-)	23½	25	23/9	—	5 5 3
British Vac. Cleaner (5/-)	20	20	8/-	+6d.	12 10 0
Brush Ord. (5/-) ...	—	10	6/-	−3d.	8 6 8
Burco (5/-) ...	35	35	20/-	+6d.	8 15 0
Chloride El. Storage	20	20	45/9	—	4 7 4‡
Cole, E. K. (5/-) ...	22½	20	16/6	−1/-	6 1 3
Cossor, A. C. (5/-)...	Nil	Nil	8/-	−9d.	—
Crabtree (10/-) ...	17½	17½	32/6	—	5 7 8
Crompton Parkinson Ord. (5/-) ...	22½	22½	11/3	—	5 0 0‡
De La Rue (5/-) ...	50	50	23/3	−9d.	10 15 0
Decca (1/-) ...	112½	112½	12/-	−9d.	9 7 6
E.M.I. (10/-) ...	8	8	18/6	+6d.	4 6 5
Electrical Components (5/-) ...	20	20	11/3	+6d.	8 18 0
Elec. Construction	12½	12½	45/9	−9d.	5 9 8
Enfield Cable Ord.	7½	7½	28/3	—	5 6 2
English Electric ...	10	10	41/6	−2/-	4 16 5
Ericsson Tel.(5/-) ...	20†	20†	40/-	—	2 10 0
Ever Ready (5/-) ...	40	40	28/9	—	6 18 10
Falk Stadelmann ...	15	15	35/-	−⅛	8 11 6
G.E.C. Ord. ...	17½	17½	72/6	−3/-	4 16 8
General Cables (5/-)	50	50	17/6	—	8 11 6‡
Greenwood & Batley	15	15	38/9	+⅛	7 14 8
Hackbridge Cable (5/-)	—	20	11/9	—	8 10 2
Hackbridge Hewittic (5/-)	12	12½	11/6	+6d.	5 8 8
Hall Tel. Acc. (10/-)	10	10	13/6	+6d.	7 8 2
Heatrae (2/-) ...	12½	12½	4/-	—	6 5 0
Henleys (5/-) ...	20	20	22/-	−6d.	4 11 0
Hoover (5/-) ...	40	40	34/9	−6d.	5 15 1
Intl. Combustion (5/-)	37½	37½	16/3	−1/-	4 13 0‡
Johnson & Phillips	15	15	61/3	—	4 17 6
Lancashire Dynamo	22½	22½	92/6	—	4 17 0
Laurence, Scott(5/-)	12½	12½	13/3	+3d.	4 15 3
London Elec. Wire	10	10	43/-	−1/-	4 13 0
J. Lucas	17½	17½	25/-	—	4 13 4‡
Mather & Platt ...	11	11	47/3	—	4 13 3
Metal Industries ...	10	10	42/-	—	4 5 3
Mid. Elec. Mfg. ...	35	35	53/9	—	—
Murex	20	20	43/9	-2/-	4 11 5‡
Newman Ind. (2/-)	22½	17½	3/6	—	—
Oldham & Son (1/-)	60	60	5/6	+3d.	5 10 0‡
Plessey (5/-) ...	20	20	15/-	—	6 13 4
Parsons C. A. ...	12½	12½	57/6	—	4 7 0
Pye Deferred (5/-)	25	25	30/9	−9d.	4 1 4
Radio & Tel. (2/-)	Nil	25	1/-	—	—
Revo (10/-) ...	27½	27½	45/-	—	6 2 3
Reyrolle	12½	12½	57/6	—	4 6 10
Scophony Baird (1/-)	—	—	3/6	—	—
Scot. Cable (4/-) ...	30	30	22/-	—	5 9 0
Siemens Ord. ...	7½	7½	31/3	+⅛	4 16 0
Switchgear & Cowans (5/-)	20	20	15/-	+2/-	6 13 4
T.C.C. (10/-) ...	15	15	32/6	—	4 12 4
T.C. & M. ...	10	10	37/6	—	4 5 4‡
Telephone Mfg. (5/-)	9	9	9/-	+6d.	5 0 0
Thorn Elec. (5/-) ...	25	20	18/9	—	5 6 8
Tube Investments	25	25	5¾	−¼	4 6 10
Vactric (5/-) ...	Nil	Nil	10/-	−⅛	—
Veritys (5/-) ...	5	5	3/6	+6d.	7 2 10
Walsall Conduits (4/-)	70	70	53/9	—	5 4 1
Ward & Goldstone (5/-)	50	50	36/3	−9d.	5 10 4‡
Watford (2/-) ...	15	20	6/3	—	6 8 0
Westinghouse Brake	14	14	60/6	−2/-	4 12 —
West, Allen (5/-) ...	10	10	6/9	−6d.	4 12 7‡
Transport and Communications					
Anglo-Am. Tel: Pref.	6	2⅝*	95	—	—
Def.	1½	1½*	15½	+3	—
Anglo-Portuguese...	8	8	24/-	+6d.	6 13 4
Brit. Elec. Traction: Def. Ord. ...	50	50	460	—	3 12 6‡
Calcutta Trams ...	Nil	6†	24/6	—	4 18 0
Cape Elec. Trams...	6	6	23/-	—	5 4 4
Cable & Wireless: 5½ Pref. ...	5½	5½	100	+1	5 10 0
Ord.	4	4	255½	+4½	1 11 2
Globe Tel. & Tel. Ord	5†	5†	43/9	+⅝	2 5 8
Great Northern Tel. (£10)	12	7	14	—	5 0 0
Inter. Tel. & Tel....	Nil	Nil	25	+6½	—
Marconi Marine ...	7½	7½	25/-	—	6 0 0
Oriental Tel. Ord....	10	16	47/-	+2/6	6 16 3
Telephone Props ...	6	6	18/6	+3/6	6 9 9
Tele. Rentals (5/-)	10	10	10/-	—	5 0 0

*Dividend postponed.

†Dividends are paid free of Income Tax.

‡ Yield adjusted to capital bonus issue.

NEXT WEEK'S EVENTS

Monday, 6th February

BIRMINGHAM.—James Watt Memorial Institute, 6 p.m. I.E.E. South Midland Centre. "Television Radio Relay Links," by A. H. Mumford and C. F. Booth. (Joint meeting with the Institution of Post Office Electrical Engineers.)

BRISTOL.—Electricity House, Colston Avenue, 6 p.m. I.E.E. Western Centre. "Magnetic Amplifiers," by A. G. Milnes.

LIVERPOOL.—At the Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey & North Wales Centre. "The Performance of the British Grid System in Thunderstorms," by Dr. J. S. Forrest.

LONDON.—Savoy Place, W.C.2, 6 p.m. I.E.E. Education Discussion Circle. Discussion on "What can Usefully be Taught to Students about Ferromagnetism?" Opened by F. Y. Poynton.

At the Geological Society, Burlington House, W., 5.30 p.m. Society of Engineers. Presidential address by C. L. Boucher, followed by the annual dinner.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio & Measurements Group. Discussion on "Control & Measuring Equipment: Electronic versus Non-Electronic Apparatus."

ROMFORD.—Mawney's Arms, Mawney's Road, 8 p.m. A.S.E.E. North-East London Branch. "Power Cables," by H. E. Tickner.

SHEFFIELD.—The University, 6 p.m. I.E.S. Sheffield Centre. "The Latest in Electric Lamps," by H. L. Privett.

Tuesday, 7th February

CAMBRIDGE.—Cavendish Laboratory, 8.15 p.m. I.E.E. Cambridge Radio Group. "Some Considerations in the Design of Negative Feed-Back Amplifiers," by W. T. Duerdoth.

LEEDS.—Y.E.B. offices, 1, Whitehall Road, 6.30 p.m. I.E.E. North Midland Centre. "The Design, Specification and Performance of High-Voltage Surge Diverters," by H. F. Jones & C. J. O. Garrard.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "A New Precision A.C. Voltage Stabilizer," by Dr. G. N. Patchett. "An Instrument for the Measurement of Rate of Change of Power-System Frequencies," by Dr .E. Bradshaw & M. Z. Tanyeloglu.

MANCHESTER.—Engineers' Club, 6.15 p.m. I.E.E. North-Western Centre. "The Motor Uniselector and the Technique of its Application in Telecommunications," by W. H. Grinsted.

NOTTINGHAM.—Gas Department Demonstration Theatre, 6.30 p.m. I.E.E. East Midland Centre. "The Measurement of Light and Colour," by G. T. Winch.

WORCESTER.—Recreation Club Rooms, Hylton Road, 7 p.m. E.P.E.A. Midland Technical Group. "Power Stations, Past and Present," by F. W. Lawton.

Wednesday, 8th February

GLASGOW.—Grosvenor Restaurant, 6 for 6.30 p.m. I.E.E. Scottish Centre. Dinner-dance and visit of President.

LANCASTER. — N. W. E. B. Demonstration Theatre, North Road, 7 p.m. I.E.E. North Lancashire Sub-Centre. "The Phase/Neutral System of Supply for Rural H.V. Distribution," by G. T. Garwood and G. J. Websdale.

LONDON.—Café Royal, 6.30 for 7 p.m. I.E.E. Measurements Section. Dinner.

I.E.E. London Students' Section, 2 p.m. Visit to the Charlton Works of the London Transport Executive.

At the Institution of Mechanical Engineers, Storey's Gate, S.W.1, 2.30 p.m. Institution of Heating and Ventilating Engineers. Annual general meeting and presidential address.

MAIDSTONE.—Royal Star Hotel, 7.30 p.m. A.S.E.E. Kent Branch. "Refrigeration."

Thursday, 9th February

BRISTOL.—Electricity House, 7 p.m. I.E.E. Bristol Students' Section. "Protective Systems in A.C. Networks," by J. Gillians.

DUNDEE.—Royal Hotel, Union Street, 7 p.m. I.E.E. North-East Scotland Sub-Centre. "Service Apparatus," by L. B. Perkins.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Utilization Section. "The Modern A.C. Electric Hoist," by J. N. Davis. "The Volts-Per-Cycle Regulator," by F. D. Gunton. "Industrial Uses of Permanent Magnets," by P. G. Ross.

MANCHESTER.—College of Technology, Sackville Street, 6 p.m. I.E.S. Manchester Centre. Presidential address, by Dr. J. N. Aldington.

SWANSEA.—Plaza Cinema, 6 p.m. I.E.E. West Wales (Swansea) Sub-Centre. "Selection of Transformers for Use in Distribution Networks with special reference to the New Low-Voltage Standard of 240 Volts," by E. Tobin.

Friday, 10th February

BELFAST.—Grand Central Hotel. I.E.E. Northern Ireland Centre. Conversazione and dance and visit of President.

BIRMINGHAM.—Imperial Hotel, Temple Street, 6 p.m. Illuminating Engineering Society (Birmingham Centre). "Lighting in Mines—with special reference to Flame-proof Equipment," by Dr. F. W. Sharpley.

LONDON.—Caxton Hall, S.W.1, 6.30 p.m. E.P.E.A. Southern Meter Engineers' Group. "Protective Gear—Design and Testing of Circuitry and Components," by J. G. Welling.

MANCHESTER.—Engineers' Club, 6.45 p.m. Manchester Association of Engineers. "Boiler Feedwater Treatment for Low and Medium Pressures, with special reference to High Pressure Boilers," by P. Hamer.

NOTTINGHAM.—G.E.C. Showroom, Stoney Street, 7.30 p.m. A.S.E.E. Nottingham Branch. "Lumens, Lamps and Lighting," by C. S. Caunt.

Saturday, 11th February

HULL.—Y.E.B. Offices, Ferensway, 2.30 p.m. I.E.E. North Midland Students' Section. "The Historical Development of the Induction Type Energy Meter," by C. Adamson.

LONDON.—I.E.E. London Students' Section. 10.30 a.m. Visit to Battersea Power Station.

Industrial Standardization

Activities of the English Electric Co.

THE report of the Committee on Standardization of Engineering Products, set up by the Ministry of Supply in 1948 under the chairmanship of Sir Ernest Lemon, suggests that specialization, simplification and standardization, separately or altogether, are the three essentials to improved productivity.

It lists many reasons for the excessive variety which exists in British practice and implies that this variety to some extent militates against efficiency of production.

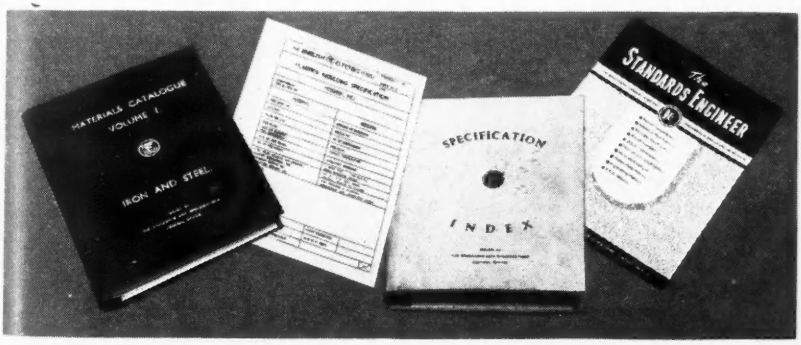
It might therefore seem that the wide range and complexity of the products of so large a manufacturing concern as the English Electric Co., together with the need to satisfy demands of consumers in every part of the world, would place grave difficulties in the way of standardization. Yet, paradoxically, the very size of this co-ordinated organization is claimed to enable it to do more standardization than would be the case, perhaps, in many firms concentrating on a narrower sphere of industry.

In 1947 there was set up a Standards and Specifications Section, which is responsible to the chief engineer, with a local office at each of the several works in the charge of an engineer, who is responsible for all standardization activities at that works. Each receives general direction and guidance from the head office of the section.

In addition, a similar organization is being set up in each of the subsidiary companies (D. Napier & Son, Ltd., Marconi's Wireless Telegraph Co., Ltd., and Marconi Instruments Co., Ltd.) which co-operate on common problems both as regards internal standardization and national standards initiated by the British Standards Institution and other bodies.

The principal function of the section is to promote and encourage the standardization of materials, components, processes and procedures, thereby maintaining effective control of shop processes, raw materials received from outside suppliers and components, whether made in the company's own works or not. Five principal instruments are employed. First, process specifications are used to express the requirements of the design and planning departments concerned; they are unambiguous instructions to production departments on methods of manufacture, and may also be used as criteria by the inspection department.

Secondly, national and B.S.I. standards are used by designers wherever possible. Thirdly, purchase specifica-



Examples of the work of the Standards and Specifications Section of the English Electric Co.

tions are used when no others are applicable, to express the requirements of design departments and to lay down the tolerances required by the inspection department. Fourthly, a materials catalogue lists all raw stock in the company, limiting those items for which there is insufficient demand and preventing the unauthorized introduction of new materials.

Finally, there are standard part volumes which list all components for every product, thereby preventing unnecessary repetition work on drawings, enabling larger stocks of fewer varieties to be carried, and assisting in the creation of a limited internal "specialization" programme. In addition there are in preparation, or completed, a number of manuals regarding procedure and data for certain designs and for drafting, manufacturing and administration. Typical examples of the above standards are reproduced.

Implementation of Policy

The five points listed above give an indication of the broad aims of the company's policy on standardization. The methods by which they are carried out include the preparation, printing, issuing and amending of the publications mentioned which, of itself, involves much work, the successful operation of which is of paramount importance.

The section further maintains a complete library both of British Standard Specifications and other British publications of similar intent; a comprehensive selection of international specifications is available for consultation whenever required. It obtains and co-ordinates comments on all draft British Standard Specifications for forwarding to B.S.I. and B.E.A.M.A. technical committees. It also prints a regular information bulletin entitled *The Standards Engineer*.

Close inter-departmental liaison ensures that the specifications laid down are acceptable to all and that they do not contravene any Government regulations or trade union practices.

Very close contact is maintained with the B.S.I. and the company is represented on a number of committees of the International Electro-Technical Commission (I.E.C.) and the International Standards Organization (I.S.O.), which comes under the administration of the United Nations.

Recommendation No. 5 among the conclusions reached by the Lemon Committee (" . . . by agreement with the parties concerned, trade associations or other appropriate co-operative bodies should undertake the responsibility of organizing work in conjunction with the B.S.I.") is therefore carried out by the English Electric Co., as are other recommendations of the Committee.

The company would be the last to claim that the organization it has set up is incapable of improvement, but it is instilling a "standardization mentality" throughout the whole organization. A standard is useful only so long as it cannot be superseded by a better standard, and must never be allowed to become an obstacle to development.

Much remains to be done before all the recommendations of the Lemon Committee are fully implemented, but the company is convinced that already real benefits have been obtained and that appreciable increases in productivity have been gained by means of a progressive, flexible and expanding standardization programme.

Whitaker's Almanack

THE 1950 edition of "Whitaker's Almanack" is now available. This standard work of reference of 1,124 pages covers a wide range of matters, and includes a wealth of information about public affairs, government, industry, commerce, social usage and the arts. With the approach of the general election it is a useful guide, with information about Parliament and parties, and a list of members, arranged alphabetically and according to their constituencies.

New information includes the boards of nationalized industries. Of the many useful features there are a list of over 1,200 of the leading societies and institutions, statistics relating to transport, fuel and power, income tax and surtax, and the working of the National Insurance Acts. There are also sections relating to Dominion and foreign politics, trade, finance and communications.

As usual there are three editions, the complete edition (cloth bound, 12s 6d net), the shorter edition (paper bound, 7s 6d net), and the library edition (ready in mid-February), which is leather bound, with coloured maps (25s net). The Almanack is published by J. Whitaker & Sons, Ltd., 13 Bedford Square, London, W.C.1.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1945

2963. British Thomson-Houston Co, Ltd.—Fluid valve constructions. 6th February, 1945. (634362.)

5799. British Thomson-Houston Co., Ltd.—Electromagnetic contactors. 8th March, 1945. (634363.)

21963. British Thomson-Houston Co., Ltd.—Resistance welding apparatus. 27th August, 1945. (634636.)

34127. British Thomson-Houston Co., Ltd.—Fluid-blast electric circuit-breakers. 17th December, 1945. (634637.)

1946

7082. British Thomson-Houston Co., Ltd., Knight, H. de B., and Herbert, L.—Enclosed electric spark gaps. 3rd September, 1947. (634433.)

8365. Marconi's Wireless Telegraph Co., Ltd.—Television tubes incorporating electron multiplier units. 18th March, 1946. (634639.)

8545. Marconi's Wireless Telegraph Co., Ltd.—Magnetrons. 19th March, 1946. (634640.)

9942. Parker, E., Wallis, P. R., Woronco, A., and Buckingham, J.—Cathode-ray tube display systems. 21st July, 1947. (634567.)

11913. Standard Telephones & Cables, Ltd.—High-frequency circuits. 17th April, 1946. (634641.)

14077. Sadir-Carpentier.—Apparatus for selecting electrical-impulse trains. 9th May, 1946. (634369.)

16791. Igranic Electric Co., Ltd.—Method of and apparatus for heating granular moulding material. 3rd June, 1946. (634643.)

22967. Igranic Electric Co., Ltd.—Apparatus for controlling a polyphase induction motor. 30th July, 1946. (634644.)

23247. Colonial Radio Corporation.—Electrical automatic tuning unit. 6th August, 1946. (634437.)

29650. British Thomson-Houston Co., Ltd. (General Electric Co.).—Electrical amplifying circuits 4th October, 1946. (634438.)

30032. British Thomson-Houston Co., Ltd., and Dyson, J.—Automatic electric control circuits. 15th March, 1948. (634651.)

30974. Marconi's Wireless Telegraph Co., Ltd.—Television and like pick-up tubes. 17th October, 1946. (634652.)

32416. Ever Ready Co. (Great Britain), Ltd., and Evans, S. B.—Radio receiving apparatus. 25th September, 1947. (634373.)

33299. British Thomson-Houston Co., Ltd.—Transformers having radio-control means. 8th November, 1946. (634496.)

33423. Armstrong, E. H.—Broadcasting systems. 11th November, 1946. (634374.)

33856. Philco Corporation.—Electromagnetic scanning circuits employing thermionic valves. 14th November, 1946. (634442.)

33906. Allmanna Svenska Elektriska Aktiebolaget.—Rectifier with voltage regulating transductor. 15th November, 1946. (634653.)

34861. General Electric Co., Ltd., and Pearce, A. G.—Seals for electric-discharge devices. 22nd April, 1949. (634443.)

35112. Holman, H. E.—Method of producing metal structures especially metal mesh screens such as are suitable for use in television transmission tubes. 15th October, 1947. (634376.)

35264. Cole, Ltd., E. K., Martin, A. W., and Hunt, H.—Radio receiver with clock-controlled switch. 28th November, 1947. (634377.)

35265. Cole, Ltd., E. K., Martin, A. W., and Hunt, H.—Radio receivers adapted to operate an alarm. 28th November, 1947. (634378.)

35480. Hughes, C. L. (Electro-Physical Laboratories, Inc.).—Electrocardiograms. 29th November, 1946. (634575.)

35676. British Thomson-Houston Co., Ltd., and Anderson, J. R.—Electric induction apparatus. 20th November, 1947. (Addition to 622537.) (634379.)

37188. Sangamo Weston, Ltd., and McBride, M. G.—Electrically operated temperature measuring apparatus. 12th December, 1947. (634444.)

1947

311. Marconi's Wireless Telegraph Co., Ltd.—Electron-discharge tubes. 3rd January, 1947. (634656.)

1397. Hazeltine Corporation.—Television signal-translating system. 15th January, 1947. (634501.)

1847. Rose, J. C.—Attenuator circuit arrangements such as volume control circuit arrangements for audio amplifiers, radio receivers and the like. 7th January, 1948. (634383.)

1900. Sun-Vic Controls, Ltd., and Davis, N. R.—Electronic valve circuit arrangements. 20th February, 1948. (634384.)

2055. Laboratoires Radioelectriques.—Apparatus for measuring the gain factor or Q of resonant electric systems. 22nd January, 1947. (634576.)

2056. Laboratoires Radioélectriques.—Apparatus for measuring the h.f. ohmic resistance of piezo-electric crystals. 22nd January, 1947. (634577.)

3030. Standard Telephones & Cables, Ltd.—Display system for supervision of air traffic and the like. 31st January, 1947. (634386.)

5129. Standard Telephones & Cables, Ltd.,—Radio beacon system. 21st February, 1947. (634389.)

6176. Sangamo Weston, Ltd.—Electrical control devices. 4th March, 1947. (634660.)

6795. Windsor Manufacturing Co., Ltd., and Collins, A. L.—Electric lamps more particularly for bicycles or other road vehicles. 18th February, 1948. (634392.)

8015. Philips Lamps, Ltd.—Magnetic cores for use at high-frequencies. 24th March, 1947. (634504.)

8885. Standard Telephones & Cables, Ltd.—Antenna system. 1st April, 1947. (634508.)

9154. Crompton Parkinson, Ltd., and Freedman, P.—Discharge-lamp circuits. 5th April, 1948. (634509.)

9155. Crompton Parkinson, Ltd., and Serner, A.—Discharge-lamp circuits. 5th April, 1948. (634510.)

12384. Sperry Gyroscope Co., Inc.—Adjustable attenuating apparatus for high-frequency electromagnetic energy. 7th May, 1947. (634400.)

12591. Soc. des Appareils, G. A. L.—Electric heating elements of the resistance type. 9th May, 1947. (634670.)

13905. Philips Lamps, Ltd.—Short-wave mixing circuits. 23rd May, 1947. (634403.)

16199. Soundscriber Corporation. — Method and apparatus for recording sound waves. 19th June, 1947. (634586.)

17710. Sperry Gyroscope Co., Inc.—Frequency indicators. 4th July, 1947. (634523.)

17863. General Electric Co., Ltd., and Polgreen, G. R.—Apparatus using a magnetisable recording medium. 5th August, 1948. (634675.)

18129. American Air Filter Co., Inc.—Apparatus for electrically precipitating suspended particles from gases. 9th July, 1947. (634676.)

19437. Measurement, Ltd., Hewlett, S. J., and Howard, E.—Prepayment mechanism for meters. 11th December, 1947. (634524.)

19632. Pye, Ltd., and Dalgleish, J. W.—Electrical apparatus, such as radio and television receivers. 22nd July, 1947. (634415.)

21691. Sylvania Electric Products, Inc.—Apparatus for coating fluorescent lamps. 7th August. 1947. (634469.)

22320. Jessop & Sons, Ltd., W., and Hadfield, D.—Permanent magnets. 11th September, 1948. (Cognate application 2649.) (634686.)

22592. Westinghouse Electric International Co.—X-ray systems. 14th August, 1947. (634687.)

23093. Standard Telephones & Cables, Ltd., and Baguley, E. — Electric cables. 20th August, 1948. (634469.)

23692. Stone & Co., Ltd., J., and Nixon, L. R.—Pole-changing switches for dynamo-electric machines. 18th August, 1948. (634472.)

25358. Oxford, A. J. H.—Apparatus for the electrical transmission of data. 27th August, 1948. (634449.)

25366. Automatic Telephone & Electric Co., Ltd., and Spears, R. A.—Mounting arrangements for piezo-electric crystals. 17th September, 1947. (634450.)

25538. Standard Telephones & Cables, Ltd.—Number responsive devices. 19th September, 1947. (634695.)

25691. Pirelli Soc. Per Azioni.—Electric cables. 22nd September, 1947. (634451.)

25929. Standard Telephones & Cables, Ltd., and Roberts, W. L.—Multi-channel pulse communication systems. 17th September, 1948. (634452.)

27171. Telefonaktiebolaget L. M. Ericsson.—Production of sheet iron cores for electrical machines. 9th October, 1947. (634697.)

27383. Spencer, A., and Good, G.—Electrical frequency regulators. 13th October, 1948. (634456.)

30241. Regie Nationale des Usines Renault.—Multi-contact switch in particular for machine-tool carriers. 13th November, 1947. (634539.)

31876. Ekco-Ensign Electric, Ltd., and Stickley, W. A.—Circuit arrangements for gaseous electric-discharge lamps. 23rd July, 1948. (634355.)

32196. Telegraph Construction & Maintenance Co., Ltd., and Sanders, H. R. E.—Submarine cable repeater housings. 6th December, 1948. (634483.)

33797. Standard Telephones & Cables, Ltd.—High-frequency transmission circuits over power lines. 22nd December, 1947. (634423.)

33839. Aktiebolaget Tudor.—Grid plates for electric accumulators of the lead-sulphuric acid type. 22nd December, 1947. (634541.)

33893. Dunlop Rubber Co., Ltd., Powell, E. F., and Bulgin, D.—Electric leads for ignition systems. 7th December, 1948. (Addition to 619030.) (634358.)

34582. Olthof, M., and Olthof, T. (trading as Transformatorenfabriek Firma Gebr. Olthof).—Variable current electrical transformers. 30th December, 1947. (634426.)

1948

1315. British Thomson-Houston Co., Ltd., and Wells, R. S.—Production of luminescent calcium tungstate. 14th February, 1949. (634616.)

2140. Standard Telephones & Cables, Ltd., and Wooltorton, E.—Hermetically sealed electrical components. 21st January, 1949. (634544.)

2692. Westinghouse Electric International Co.—Arc-extinguishing structures for electric circuit-breakers. 29th January, 1948. (634490.)

2819. Sperry Gyroscope Co., Inc.—Ultra-high-frequency electromagnetic wave-measuring arrangements. 30th January, 1948. (634545.)

3199. Parsons, Ltd., C. H., and Handley, G. B.—Socket units of plug-and-socket connectors for electric circuits. 4th February, 1949. (634491.)

4609. Westinghouse Electric International Co.—Current transformers. 17th February, 1948. (634552.)

6470. British Transport Commission, and Readman, A.—Electric current indicating devices. 18th February, 1949. (634560.)

7100. Plessey Co., Ltd., and Keir, L.—Holders for thermionic valves and the like devices. 8th March, 1949. (634622.)

INDIAN TRADE

Large Imports of Machinery

INDIA'S overseas trade in electrical equipment during the last financial year, i.e., to March, 1949, showed an increase of about 70 per cent in imports of machinery. Britain's share of the total of Rs.12.7 crores being Rs.9.5 crores and that of the United States Rs.2.3 crores. Britain improved her position in the trade in apparatus, etc., her share being Rs.8.5 crores out of a total of Rs.11.4 crores, with the United States represented by Rs.1.3 crores. The values include the seaborne trade of India with Pakistan.

Class of Goods	1948-49 Rs. (000)	Inc. or dec. on 1947-48 Rs. (000
Telegraph and telephone wires and cables	3,28	— 1,22
Electric fans and parts	2,12	— 24,04
From United Kingdom	90	— 20,41
,, *United States*	65	— 32
Wires and cables, not telegraph or telephone	4,17,48	+1,47,67
From United Kingdom	3,96,73	+1,38,44
,, *United States*	16,53	+ 11,10
Telegraph and telephone instruments and apparatus	38,71*	+ 8,38
Electric lamps	26,65	+ 6,17
From United Kingdom	14,96	+ 2,34
,, *United States*	3,72	— 2,31
Vacuum electric bulbs	12,92	+ 2,42
From United Kingdom	4,52	— 28
,, *United States*	5,60	+ 2,89
Bulbs for automobiles	10,00	+ 5,99
Bulbs for torches	16,52	+ 3,30
Other electric lamps	95,28	— 38
Parts and accessories of elec. lamps	31,99	+ 16,64
Batteries	17,66	+ 9,63
From United Kingdom	6,99	+ 3,98
,, *United States*	5,23	+ 2,23
Accumulators and parts	12,90	— 5,82
Electric condensers	4,41	— 2,38
Electric bell apparatus	2,24	— 61
Elec. lighting accessories and fittings, including switches	78,65	— 16,22
Meters	1,07,93	+ 31,77
From United Kingdom	98,77	+ 28,58
,, *Switzerland*	6,41	+ 3,60
Other electrical instruments	21,78	— 4,58
Electro-medical apparatus	31,37	+ 32
From United Kingdom	7,37	+ 1,08
,, *United States*	18,92	— 2,87
Switchboards, not telegraph or telephone	18,31	+ 14,05
Electrical porcelain	1,69	— 20
Other electrical goods and apparatus	1,65,00	— 23,96
From United Kingdom	1,12,88	+ 6,19
,, *United States*	39,82	— 16,20
Radio apparatus	1,36,66	— 2,24,82
From United Kingdom	93,43	— 1,02,66
,, *United States*	16,37	— 1,19,82
Control and switchgear	2,68,14	+ 89,17
Generators, alternators and dynamos	2,15,73	+ 58,06
Motors	3,14,34	+ 37,75
Transformers	1,09,90	+ 62,49
Turbo-generating sets	34,45	— 4,67
Other electrical machinery	3,32,87	1,54,90

* Mainly from U.K.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section, the date of the issue is given in parentheses.

Belfast.—17th February. Electricity Department. Loud-speaking telephone installation. (See 27th January issue.)

Belgium.—BRUSSELS.—13th February. Belgian State Railways. Supply of thirty-two transformers. (C.R.E. (I.B.) 41507/50. Ten/939.)*

Crayford.—27th February. U.D.C. Supply of electrical goods and electric boilers for one year. Surveyor, Town Hall.

Derbyshire.—18th February. County Council. Cables, conduit, lamps and electrical accessories for year ending 31st March, 1951. (See 27th January issue.)

Droitwich.—10th February. Corporation. Installation of electricity in 218 Council houses. (See 27th January issue.)

Durham.—County Council. Electrical installation at East Hetton New County School and eight police houses at Gilesgate Moor. G. R. Clayton, county architect, Court Lane, Durham.

Egypt.—CAIRO.—18th February. Director General, Electricity and Gas Administration. Switchgear. (See 27th January issue.)

Hartlepool.—27th February. Corporation. Amplifying equipment at the Borough Hall. (See 27th January issue.)

India.—MADRAS.—3rd April. Government Department of Electricity. Tunnel pond dam and tunnel intake headworks for Machkund hydro-electric scheme. (C.R.E. (I.B.) 40975/50. Ten/938.)*

Ledbury.—21st February. U.D.C. Electrification of Massington pumping station and swimming baths purification plant. (See 27th January issue.)

London.—17th February. Metropolitan Water Board. Supply of electric lamps for one year. Chief engineer, New River Head, Rosebery Avenue, E.C.1.

Morocco.—TANGIER.—16th March. International Administration. One 950 kW and two 2,000 kW generator sets. (C.R.E. (I.B.) 40516/50. Ten/926.)*

28th February. Telefonica de Tangier S.A. Cables with lead casing and copper conductors. (C.R.E. (I.B.) 40903/50. Ten/936.)*

Poole.—21st February. Borough Council. Supply of electric lamps, cables, fittings, electric water heaters, street lighting lanterns and electric conduit and wiring accessories, for one year. J. R. Barron, borough engineer, Municipal Buildings.

Preston.—20th February. Corporation. Electrical installations in sixty-seven houses. Brookfield estate. (See this issue.)

Rothwell.—11th February. U.D.C. Sodium street lighting. (See 27th January issue.)

Runcorn.—27th February. U.D.C. Supply of electric lamps for one year. Surveyor, Town Hall.

Ryton-on-Tyne.—U.D.C. Electric lighting and heating work at 32 houses on Runhead estate. Surveyor, Council Offices.

Sandown - Shanklin.—18th February. U.D.C. Amplification equipment for concert pavilion. (See 27th January issue.)

Solihull.—20th February. U.D.C. Supply of electrical fittings and lamps for one year. Surveyor, 90, Station Road.

Southport.—13th February. Town Council. Electrical installations in permanent houses to be erected on two sites. Borough engineer, Town Hall.

Stratford-on-Avon. — Corporation. Street lighting, Winchester-Preston trunk road. (See 27th January issue.)

Swanage.—10th February. U.D.C. Electrical installations in forty-six houses on Herston housing estate. (See 27th January.)

Washington (Durham). — 13th February. U.D.C. Electrical work in connection with the erection of forty-four houses at Blue House Lane. E. Gooseman, surveyor, Council Chambers.

ORDERS PLACED

Bedford.—Corporation. Installation of high voltage fluorescent lighting in the Town Hall (781).—Bacchus, Ltd.

Bolton.—Corporation. Blended sodium vapour lighting fittings and concrete pillars for the lighting of the Civic Centre.—Revo Electric Co., Ltd.

Carlisle.—City Council. Electrical installations in 64 houses.—North Western Electricity Board.

Houghton-le-Spring.—U.D.C. Electrical installations in a number of cottages (£204).—Hodgsons (Houghton-le-Spring), Ltd.

London.—L.C.C. Electrical installation at Sleaford Street School, Battersea Park Road.—Alpha Manufacturing & Electrical Co., Ltd. Installation at the Medburn School, N.W.1.—Norpe & Norpe.

Manchester Corporation. Electrical installations in the lodges and chapels at Philips Park Cemetery.—E. M. Evans & Son, Ltd.

Housing Committee. Electrical installations in 93 houses (contract 69A) and 90 houses (contract 70B).—A. E. Sudlow & Co., Ltd. Electrical installations in 92 houses (contract 88) at Woodhouse Park and Moss Nook.—H. C. Taylor & Co.

* Specifications may be inspected at the Commercial Relations and Exports Department, Board of Trade, Thames House North, Millbank, S.W.1 (Victoria 9040).

CONTRACTS IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberystwyth.—Houses (54); borough surveyor.

Ashington.—Improvements to Ashington Hospital for the Newcastle-on-Tyne Regional Hospital Board, Osborne Road, Newcastle-on-Tyne (£166,000); P. H. Knighton, Board's architect.

Ayr.—Proposed conversion of Robertson Memorial Church into theatre; burgh surveyor.

Barrow-in-Furness.—County junior school, South Newbarns; Cruickshank & Seward, architects, 16, Princess Street, Manchester.

Factory, Park Road, Ormsgill; Town Tailors, Ltd., Mabgate, Leeds.

Birmingham.—Extensions to works; Dunlop Rubber Co., Ltd., Fort Dunlop.

Blackpool.—Three-storey flats (105), Mereside estate; borough surveyor.

Bootle.—Assembly hall portion of proposed Orrell branch library (£28,882); W. A. Harrison, borough engineer.

Boreham Wood.—Factory; Edgware Optical Co., Ltd., 243, Deansbrook Road, Edgware.

Bourne.—Houses (46), Ancaster Road, for U.D.C.; W. E. Norman Webster, architect, Spalding.

Brentford & Chiswick.—Flats (96), St. Thomas's, Chiswick; W. F. J. Church, town clerk, Town Hall, W.4.

Burslem (Staffs).—Extensions for J. Sadler & Sons, Ltd.; G. Percy Trentham, Ltd., Longford, Staffs.

Cardiff.—Large office block on site near Greyfriars Road; National Coal Board.

Castleford.—Houses (46), Lumley Avenue estate; W. E. S. Barnes, clerk to U.D.C., Town Hall.

Cheadle.—Houses for R.D.C. at Cresswell and Black Lane estate; L. Bates, Bycars Road, Burslem, Stoke-on-Trent.

Chelmsford.—Block of flats, Woodhall estate; A. E. Wiseman, architect, 10, Duke Street.

Printing works and offices, Bradford Street; *Essex Chronicle*, 98, High Street.

Chesterfield.—Houses (243) for R.D.C.; B. Wikeley, surveyor.

Cirencester.—Houses (40), Shepherds Way, for U.D.C.; John Laing & Son, Ltd., Bunns Lane, Mill Hill, N.W.7.

Conway.—Dwellings (40), Pen Garth estate; J. M. Porter & Co., architects, Estate Office, Colwyn Bay.

Coventry.—College of art (£100,000) and civic restaurant (£68,000); D. E. E. Gibson, city architect.

Craghead (Co. Durham).—Factory for Webwear, Ltd.; Napper & Taylor, architects, 52, Eldon Place, Newcastle-on-Tyne.

Crawley.—Houses (133), No. 1 site, Northgate; chief architect; Crawley Development Corporation, Broadfield, Crawley, Sussex.

Derbyshire.—Police divisional headquarters, Silverlands, Buxton; county architect, St. Mary's Gate, Derby.

Darlington.—Additions to research block, Brinkburn Road, for Whessoe, Ltd.

Dundee.—Offices for Customs Waterguard, King George Wharf; Harbour Board.

Durham.—Houses (46) on the Sunderland Road housing estate; city engineer, Town Hall.

Eccles.—Houses (60), Ellesmere Park estate, section three; Geo. Wimpey & Co., Ltd., 620, Eccles New Road, Salford.

Ewell (Surrey).—County primary school, West Ewell (£45,550); Surrey county architect, Kingston-on-Thames.

Finchley.—Block of offices, 45-51, Woodhouse Road, for Ministries of Labour and National Insurance; Speechley, Mumford & Craig, architects, 10, New Square, London, W.C.2.

Gateshead.—Factory, Quarryfield Road, for Samuel Talbot (Engineers), Ltd., Low Fell, Gateshead.

Hale.—Houses (26) for U.D.C.; D. Franklyn, Station Road, Urmston, Lancs.

Halifax.—Primary school, Illingworth; A. & R. Pickles, architects, 3, Ward's End.

Kendal.—Houses (50), Hallgarth estate; J. Barnfather, borough engineer, Municipal Offices, Lowther Street.

Lindsey.—Police buildings and magistrates' courts, Scunthorpe; C. B. Pearson & Son, architects, 18, Dalton Square, Lancaster.

Liverpool.—Extensions to City College of Commerce, Tithebarn Street, and to Old Swan Technical Institute, Broadgreen Road; city architect, Dale Street, Kingsway.

London.—Old Kent Road.—Flats (45), Bridge House estate, for City of London Corporation; Victor Wilkins, architect, 12, York Buildings, W.C.2.

Greenwich.—Flats (72), Victoria Way North, Charlton; D. J. Reason, town clerk, Town Hall, S.E.10.

Newcastle-on-Tyne.—Foundry and cooling shops, Glasshouse Street, for British Engines, Ltd.; Bowey & Son, builders, Back Rabbit Street, Newcastle.

Peppard.—Extensions to sanatorium; Oxford Regional Hospital Board, 43, Banbury Road, Oxford.

Peterborough.—Houses (80), Crown Street; city surveyor.

Factory, Fengate; Thomas & Evans, Ltd., Hannah Street, Porth, Glam.

Road haulage depot, Fengate; Road Haulage Executive, 55, Broadway, London, S.W.1.

Plymouth.—Out-patients' block at Mount Gold Orthopædic Hospital (£40,000); J. Paton Watson, borough surveyor, The Guildhall.

Salford.—Flats (293) and shops; city engineer.

Swansea.—Electrical installations in schools under 1950 programme; Hoare, Lea & Partners, consulting engineers, 39, Broad Street, Bristol.

Urmston.—Additional classrooms at county primary school; Bristol Aeroplane Co. (Housing), Ltd., in conjunction with Gilbert Ash, Ltd., London.

West Riding.—Police headquarters, Otley (£90,000); county architect, County Hall, Wakefield.